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Ground-Water Monitoring Program at Love Canal Volume 1. Final Report. Volume 2. Well Logs and Diagrams

JRB Associates, Inc., McLean, VA

Prepared for

Environmental Monitoring Systems Lab.
Research Triangle Park, NC

Aug 83

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THE GROUND-WATER MONITORING PROGRAM AT LOVE CANAL:
Volume I. Final Report
Volume II. Well Logs and Diagrams

by

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Charles Kufs, Philip Spooner, G. Thomas Farmer, and Davi Twedell.

PERFORMER: JRB Associates, Inc., McLean, VA.
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SPONSOR: Environmental Monitoring Systems Lab., Research Triangle Park, NC.
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The report summarizes the ground-water monitoring program implemented at the Love Canal disposal site in Niagara Falls, New York. This study, which was part of a much larger investigation of the site, was aimed at describing the area's geology and hydrogeology, and identifying potential barriers to, and routes of, contaminant transport. Analyses of the geologic information collected during the study indicate that swales, sandy zones, and perhaps dehydration cracks in the clays are potentially important routes of contaminant transport in the overburden. Vertical fractures and bedding plane separations are potentially important routes in the bedrock.

KEYWORDS: *Solid waste disposal, *Ground water, *Water pollution, *Love Canal, *Monitoring.

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ABSTRACT

The report summarizes the ground-water monitoring program implemented at the Love Canal disposal site in Niagara Falls, New York. This study, which was part of a much larger investigation of the site, was aimed at describing the area's geology and hydrogeology, and identifying potential barriers to, and routes of, contaminant transport.

The Love Canal area is situated in a region that has been subjected to several advances and retreats of continental glaciers which left a 0.3 to 8 meter(1 to 26 foot) thick layer of silty clay till overlying the Lockport Dolomite (bedrock). Above this till, are two silty clay layers totaling 2 to 8 meters (7 to 26 feet) in thickness which are deposits of former lakes bordering the continental glacier. The surface materials above the clays consist of highly variable natural soils and fill which range from about 8 centimeters (3 inches) to 1 meter (3 feet) in thickness.

During August 20, 1980 to October 15, 1980, 178 ground-water monitoring wells were installed, half of which were completed in the top 1.5 meters (5 feet) of bedrock, and half of which were completed in the unconsolidated material (overburden) overlying the bedrock. Each of the wells was subsequently sampled for EPA's 129 priority pollutants and several other chemical parameters. Results of the laboratory analysis of the ground-water samples will be presented in a report to be issued by EPA's Robert S. Kerr Environmental Research Laboratory.

Analyses of the geologic information collected during the study indicate that swales, sandy zones, and perhaps dehydration cracks in the clays are potentially important routes of contaminant transport in the overburden. Vertical fractures and bedding plane separations are potentially important routes in the bedrock. Water and contaminant movement will potentially be retarded by the clays and the till in the overburden and by the impermeable layer at the top of the bedrock. However, each of these barriers is quite variable in its composition and may not be an effective retardant to water and contaminant movement everywhere in the study area.

This report was submitted in partial fulfillment of contract number 1-619-026-222-003B by JRB Associates and Science Applications, Inc. under the sponsorship of GCA Corporation and the Environmental Protection Agency. This report covers a period from August 22, 1980 to July 15, 1981, and work was completed as of September 30, 1981.

NOTICE

This document has been reviewed in accordance with U.S. Environmental Protection Agency policy and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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SECTION 1

INTRODUCTION

Love Canal, in Niagara Falls, New York, was recently the subject of the most extensive investigation of a hazardous waste disposal facility ever undertaken. Under the direction of the Office of Research and Development of the Environmental Protection Agency (EPA), a team of technical experts was assembled to conduct the study by GCA Corporation (GCA) of Bedford, Massachusetts.

EPA's investigation of the Canal area was divided into three parts--air, biota,soil, and surface water monitoring; hydrogeologic assessment; and chemical analysis. The field portion of the hydrogeologic assessment was conducted by JRB Associates of McLean, Virginia, and Science Applications, Inc. of La Jolla, California (JRB/SAI). This report presents the results of JRB/SAI's activities.

JRB/SAI's role in the project involved installing and sampling groundwater monitoring wells and evaluating the area's hydrogeology. This evaluation included logging all wells, and conducting aquifer tests on selected wells. JRB/SAI's task was to define the general hydrologic properties of the two-aquifer system underlying the site, and to identify pathways and barriers to contaminants, both within and between the two water-bearing zones.

The specific goals of JRB/SAI's portion of the study were to:

- Describe the geology and hydrogeology of the Love Canal area
- Identify contaminant transport routes and barriers based on the area's hydrogeology
- Define the extent of contamination expected based on the area's hydrogeology

To achieve these goals, 178 wells were completed within various geologic horizons during the August 20, 1980 to October 15, 1980 study period. The data collected over most of the area consisted primarily of descriptions of geologic materials encountered; static water levels in both water-bearing zones; water samples from all completed wells; and in selected holes, data on the aquifer characteristics. JRB/SAI also supervised all drilling and sampling operations.

This report is divided into four sections: Introduction, Literature Review, Methods, and Results. The remainder of this section describes the general regional setting and geology of the study area, and a review of basic hydrogeologic concepts. Section 2 presents a more detailed background on the Canal area based on published reports. Section 3 describes the methods that

JRB/SAI employed in conducting the study, and the rationale for using these specific methods. Section 4 presents the results of the investigation in terms of the geology of each of the two water-bearing zones and the relationships between the two zones.

REGIONAL SETTING

Regional setting here refers to the physical surroundings of Love Canal that are pertinent to the discussion of the site's hydrogeology. This section is divided into four parts: Location and History of the Canal, Cultural Features, Climate, and Physiography.

Location and History

Love Canal is located near the southeastern boundary of the City of Niagara Falls in northwestern New York. It is bounded on the north by Colvin Boulevard, on the east by 99th Street, on the south by Frontier Avenue, and on the west by 97th Street. The Canal is about 915 meters (3,000 feet) long and 30 meters (100 feet) wide. Its depth is uncertain, but has been estimated at 12 meters (40 feet). At the time of this study, the Canal area was fenced, and entrance was restricted to study participants by security guards.

The Canal was begun in the 1890s as an ambitious project of William T. Love to produce cheap electricity by connecting the upper and lower parts of the Niagara River. Though the Canal would have effectively dried up Niagara Falls, Love and New York State viewed the anticipated influx of commerce and industry to the area as worth the loss. The dream faded, however, when the development of alternating current made long-distance energy transmission possible, thus rendering the Canal obsolete before its completion.

In 1942, the Niagara Power and Development Company (then owner of the Canal) allowed what is now the Hooker Chemical Company and others to begin dumping chemical wastes in the Canal. Five years later, Hooker bought the property and expanded its dumping activities. Waste disposal at the site continued until 1952. A year later, Hooker deeded the property to the Niagara Falls Board of Education. Years later, after an elementary school and over 100 homes had been constructed, it became apparent that wastes were leaking from the site. The State of New York eventually bought all the homes bordering the Canal, and continues to maintain the site.

The area studied during this investigation extends from Cayuga Drive on the north to the Niagara River on the south, and from Williams Road on the east to Military Road on the west. Figure 1 shows this area. All groundwater monitoring wells were installed within these boundaries except for wells at three sites (42, 43, and 45) which were installed north of Cayuga Drive between 94th and 98th Streets.

Cultural Features

The area of northwestern New York State surrounding the City of Niagara Falls is primarily agricultural, with fruits and grains being the leading products grown. The City of Niagara Falls is an important manufacturing

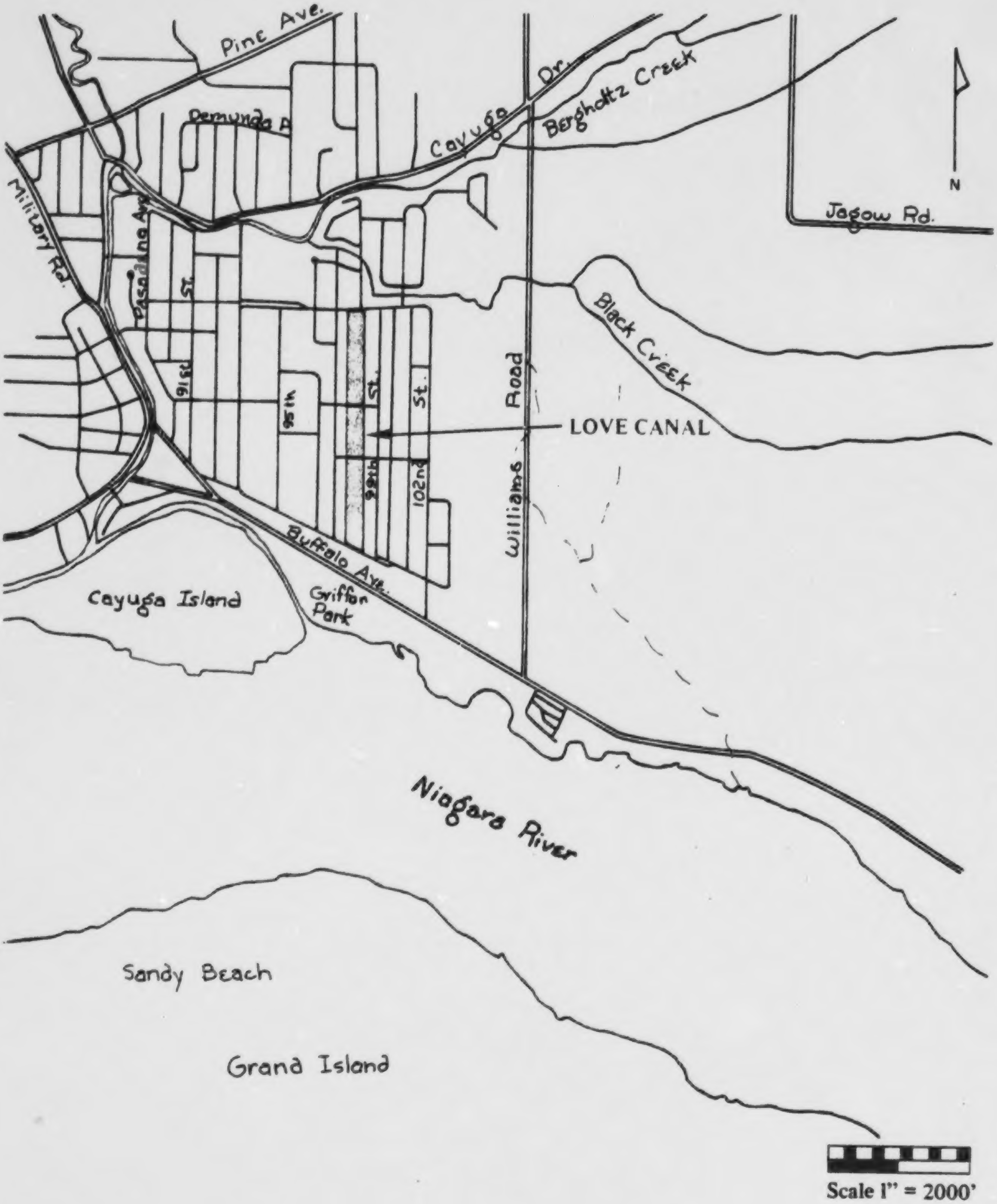


Figure 1. Site Location Map

center for electrochemical and electrometallurgical products. The main products manufactured are abrasives, caustic soda, paper, electrodes, ferro-alloys, and a variety of chemical compounds. The industrial development of the area has closely paralleled the development of hydroelectric power provided by the Falls. Tourism is an important industry also because of the Falls.

The area immediately adjacent to Love Canal is residential with low- to moderate-income housing. A public assistance housing project has been built between 93rd and 96th Streets, and extending between Colvin Boulevard and Frontier Avenue. Residents report that a brick factory formerly occupied the northeast corner of Colvin Boulevard and 93rd Street, where the local clay materials were excavated for making bricks. The extent of this clay pit has not been determined, but may have been in the area east of the 93rd Street school where fill material was encountered in some borings. A small cornfield and a wooded area lie between the residential section on the west and Williams Road on the east.

Climate

The climate at Love Canal can be described generally as humid temperate, with cold, moist winters; warm sunny summers; and no truly dry season. The mean monthly precipitation and mean monthly maximum and minimum temperatures are given for the period 1936 through 1975 in Figures 2 and 3. Mean monthly precipitation for this period ranged from 7.6 millimeters (0.30 inches) in October, 1963, to 231.9 millimeters (9.13 inches) in October, 1954. Mean monthly temperature ranged from -8.8°C (16.2°F) in January, 1945, to 24°C (75.2°F) in August, 1947. Mean annual precipitation and temperature for this period were 902 millimeters (35.5 inches) and 8.5°C (47.3°F). Table 1 summarizes five-year precipitation averages at Buffalo, New York for the period 1936 through 1975. This summary shows the primary "wet" periods since dumping began at the Canal to be 1951 to 1960, and 1971 to 1975.

The climate is influenced to a considerable degree by its proximity to Lake Ontario. When cold fronts sweep down from Canada, the difference in temperature may be as great as 11°C (20°F) between the north and south shores of the Lake. The areas adjacent to Lake Ontario are generally regarded as the driest in the State, even though precipitation is well distributed throughout the year.

The proximity of the area to Lake Erie also modifies the climate as the prevailing winds are from the southwest. The air's passage over Lake Erie moderates its temperature so that it alleviates, somewhat, the heat of summer and the cold of winter. As a result, spring is shortened and fall is lengthened.

Precipitation in the area is also affected by topography. Moisture-laden winds from Lake Ontario retain most of their water until they reach the more hilly areas east of Niagara Falls. The mean annual precipitation at Lewiston, which is located about 8 kilometers (5 miles) northwest of the Canal, is 751.8 millimeters (29.6 inches), while the mean annual precipitation at

TABLE 1. FIVE-YEAR PRECIPITATION AVERAGES FOR THE PERIOD 1936 THROUGH 1975

Interval	Average annual rainfall (inches)	Average annual snowfall (inches of water[1])	Average total annual precipitation[2] (inches)
1936 to 1940	32.11	7.49	39.60
1941 to 1945	34.55	9.29	43.84
1946 to 1950	35.67	6.11	41.78
1951 to 1955	37.47	8.38	45.85
1956 to 1960	38.60	11.42	50.02
1961 to 1965	32.80	8.64	41.44
1966 to 1970	35.32	8.67	43.99
1971 to 1975	37.25	9.23	46.48
1936 to 1975	35.47	8.65	44.12

[1] Based on an estimate of 1 inch of water in 10 inches of snow given on page 58 of Blair and Fite (1965).

[2] The sum of the average total rainfall and the average total snowfall.

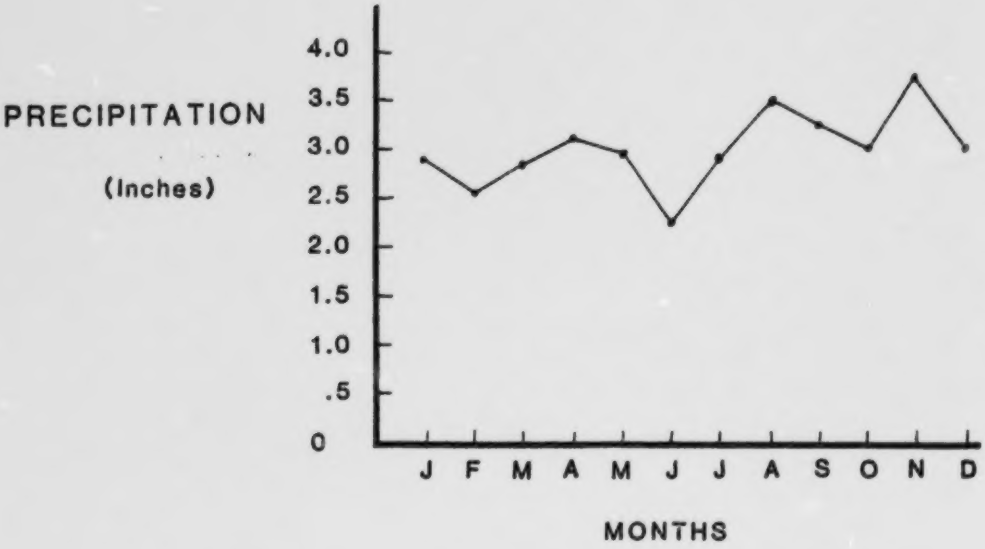


Figure 2. Mean Monthly Precipitation
for the Period 1936 through 1975.

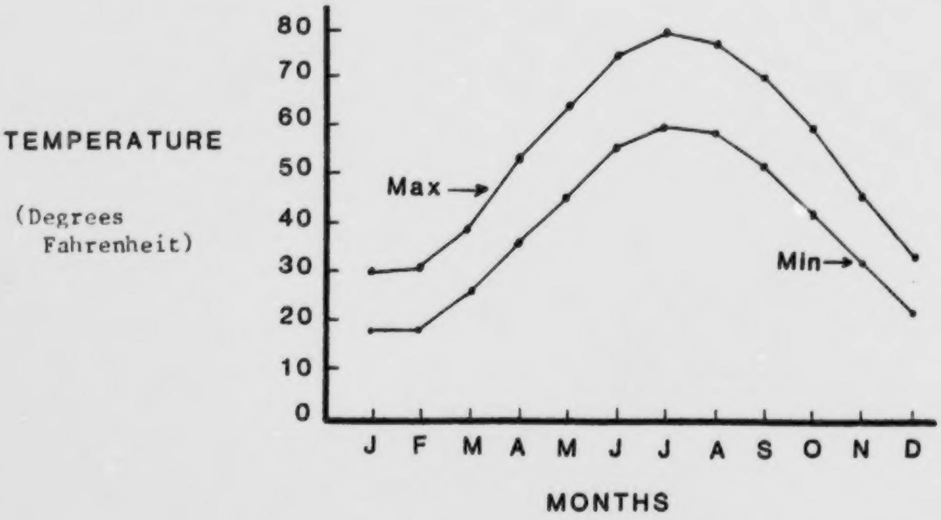


Figure 3, Mean Maximum and Minimum Temperatures
for the Period 1936 through 1975.

Lockport, which is located about 15 kilometers (9 miles) east northeast, is 823 millimeters (32.4 inches). This is significant because the Lockport area is the presumed recharge zone for the bedrock underlying the Canal.

Physiography

Love Canal lies in the Huron Plain of the Central Lowland Province, which is bounded by the Niagara Escarpment to the north, and the Onondaga Escarpment to the south (Figure 4). The Huron Plain occupies a portion of western New York State, and extends westward into Ontario, Canada. The plain is nearly flat, and lies between 174 and 177 meters (570 and 580 feet) above mean sea level in the Love Canal vicinity. It extends from the base of the Onondaga Escarpment in the south, to the top of the Niagara Escarpment in the north.

The Huron Plain is drained by a system of creeks. In the study area, most surface runoff is diverted to storm sewers, but there are three creeks adjacent to the area--Bergholtz, Cayuga, and Black creeks. Black Creek is north of the Canal, and flows west into Bergholtz Creek. Bergholtz Creek is also north of the Canal, and flows west into Cayuga Creek. Cayuga Creek is west of the Canal, and flows south into the Little Niagara River (see Figure 1). The Canal is on the floodplain of the Niagara River, about 3 meters (10 feet) higher than the River.

REVIEW OF BASIC CONCEPTS

This brief review is divided into two parts: Geology and Hydrogeology. Geology is the study of the earth, the materials that constitute it, the forces that operate on and within it, and the effects of these forces on earth materials. Hydrogeology is a subdivision of the broader science of geology that incorporates the basic principles of geology and fluid flow as it applies to the occurrence and movement of water in rocks and sediments. Geologic and hydrologic concepts relevant to this study, are discussed below.

There are three main types of rocks classified according to their origin. These are igneous, sedimentary, and metamorphic. Igneous rocks form from a molten state called magma, sedimentary rocks form from the deposition of sediments or chemical precipitates, and metamorphic rocks form by heat- and/or pressure-induced changes to either igneous, sedimentary or other metamorphic rocks. Sedimentary rocks underlie the study area with the uppermost bedrock unit being the Lockport Dolomite. Dolomite is a sedimentary rock made up mainly of the mineral dolomite-- $Ca,Mg(CO_3)_2$. Beneath the Lockport is the Rochester Shale. Shale is a rock of sedimentary origin consisting mainly of clay minerals which typically shows very thin bedding or laminations.

The rocks in the study area were described with regard to their lithology (physical character) and their stratigraphy (the manner in which the rocks were deposited). Lithologic descriptions include mineral types, grain (particle) sizes, and the presence of rock cavities and openings. Stratigraphic descriptions center mainly on bedding planes and other discontinuities.

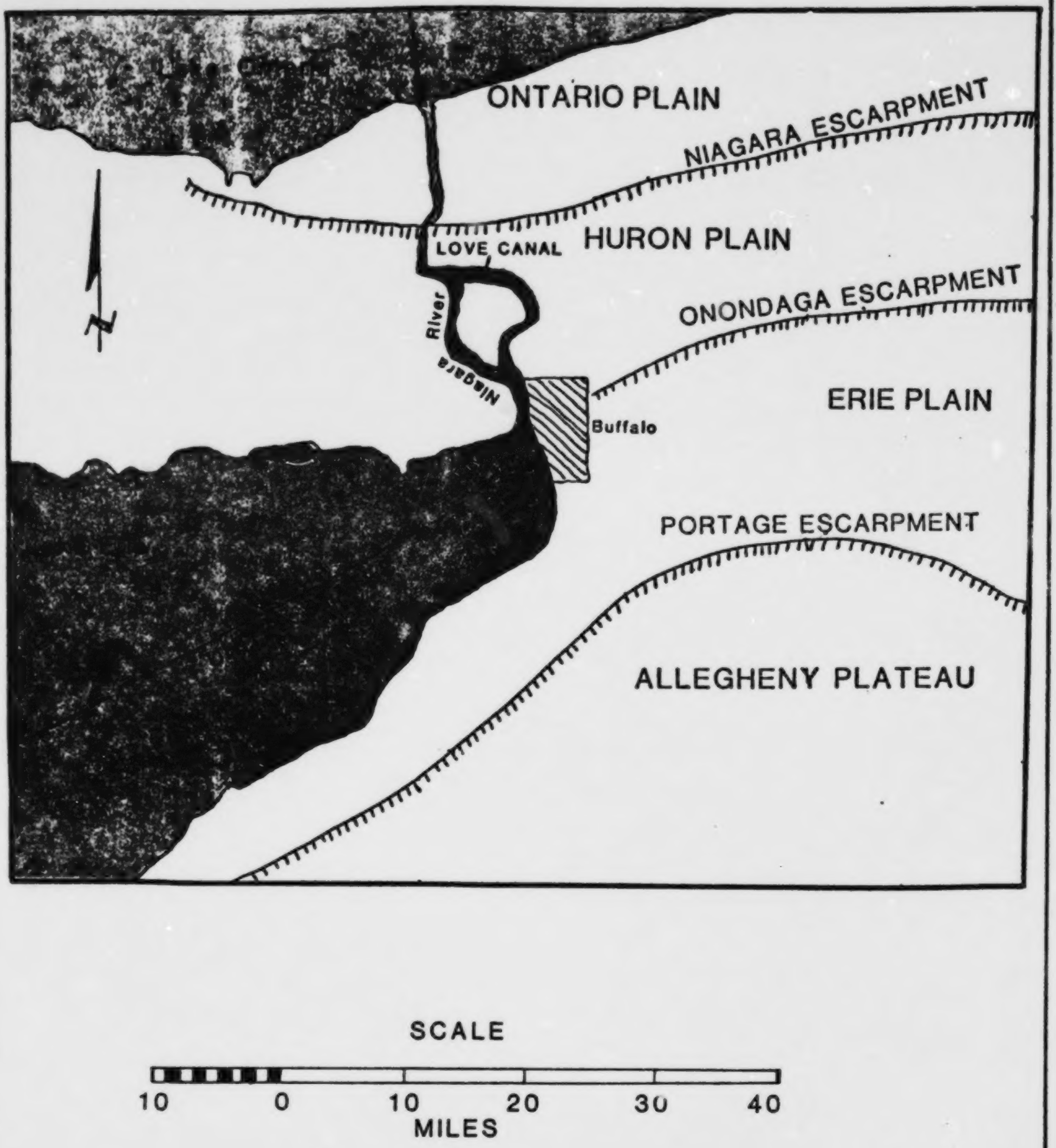


Figure 4. Map Showing the Location of the Project Area and Physiographic Provinces.

Minerals are naturally occurring substances which make up the rocks and soils of the earth. They are both inorganic and organic in origing, and have definite crystalline structures and chemical compositions. The principal minerals within the Lockport Dolomite are:

- Dolomite ($Ca,Mg(CO_3)_2$)
- Calcite ($CaCO_3$)
- Gypsum ($CaSO_4 nH_2O$)
- Pyrite (FeS_2)
- Sphalerite (ZnS)
- Galena (PbS).

Grain size is based on the maximum diameter of individual particles of sediment. Grains are described as being in one of six size classes defined as:

- Boulders--particles over 250 millimeters
- Cobbles--particles between 250 and 75 millimeters
- Gravel--particles between 75 and 2 millimeters
- Sand--particles between 2 and 0.05 millimeters
- Silt--particles between 0.05 and 0.002 millimeters
- Clay--particles under 0.002 millimeters in diameter.

Cavities and openings in rock are described using a variety of terms. The principal ones used here include bedding planes, vertical fractures, and vugs.

Bedding planes are separations between layers of sedimentary rock that occur as the sediments are deposited. They often represent changes in natural conditions, such as changes in the type of material being deposited. Bedding plane separations in the Lockport Dolomite provide potential routes for the migration of contaminants.

Vertical fractures are often formed in rocks as a result of the rock being subjected to tension. Tension causes fractures to develop which extend vertically in flat-lying rocks. Vertical fractures in the upper part of the Lockport Dolomite are well documented.

Vugs are cavities in rock which are usually lined with minerals different from those that make up the bulk of the rock. The Lockport Dolomite contains vugs lined with calcite and gypsum. If these minerals dissolve, enlarged openings or cavities form.

Other terms are used to describe materials and conditions above bedrock. For this study, all of the unconsolidated material above bedrock is termed overburden. This includes till (material deposited by glaciers), lacustrine (lake-laid) sediments, and some alluvial (stream-deposited) material. When the term soil is used, it refers to the surface materials capable of supporting plant life. Features described in the overburden include dessication cracks, sand lenses, surface drainage, and swales.

Dessication or dehydration cracks are small polygonal fissures formed in fine-grained sediments as a result of shrinkage due to loss of water. Dessication cracks were observed at the surface, and extended an unknown distance into the overburden of the area.

Sand lenses are lenticular deposits of sand or other coarse material. They become thinner laterally, and are usually of local rather than regional extent. Sand lenses have been found scattered in the clays, till, and surface soils in the Love Canal area. These may provide routes for water and contaminant movement in the overburden.

Surface drainage refers to water which drains off the surface of the land. The majority of the surface drainge in the vicinity of Love Canal is to the Niagara River. Smaller streams in the area include Bergholtz, Cayuga, and Black Creeks.

Swales are trough-like depressions in predominantly level areas which provide routes for surface drainage during wet periods. If these are filled with coarse materials such as sand, they are significant routes for the movement of water and contaminants.

Hydrology is the study of the properties, distribution, and circulation of water on the surface of the earth, in earth materials (i.e., soils and rocks), and in the atmosphere. Hydrogeology deals with the study of water-bearing units of rock or sediment called aquifers. These are generally porous materials such as sand and gravel deposits or sandstones and carbonates, that yield water to wells, springs, and streams. Two aquifers underlie the Love Canal area, the overburden and the Lockport Dolomite. Both aquifers are potential routes for the migration of contaminants.

Aquifers may be classified as confined or unconfined depending on the presence of a water table. In an unconfined aquifer, the water table is a surface equal to the atmospheric pressure. A confined or artesian aquifer is one in which the ground water is confined under a pressure greater than atmospheric by overlying, relatively impermeable strata. In the area of Love Canal, the overburden is an unconfined aquifer, and the Lockport Dolomite is a confined aquifer.

The level to which water will rise in a well screened in an aquifer is called the piezometric head at that point. A piezometric or potentiometric surface is an imaginary surface coinciding with the piezometric head of the water in the aquifer. The slope of a potentiometric surface is referred to as the ground-water gradient. As in rivers, ground water flows down gradient. In the vicinity of Love Canal, ground water flows towards the Niagara River.

Places where the water table intersects the land surface, such as springs, streams, or lakes, are points of recharge or discharge. Recharge is the addition of water to an aquifer and discharge is the release of water from an aquifer. Both recharge and discharge are expressed as a volume of water per unit of time. The overburden aquifer is locally recharged through infiltration, the downward entry of water from the surface. The Lockport Dolomite is recharged many miles to the north of Love Canal where the overburden is more permeable.

In the course of this study, tests were conducted to determine the hydrogeologic characteristics of the aquifers in the Love Canal area. Two types of tests were performed--pumping and slug tests. Pumping tests involve measuring the amount and rate of drawdown in wells close to a well being pumped at a known rate. Results of these tests are used to determine transmissivity and storage coefficient of the aquifer being tested. Slug tests involve filling a test well with water and measuring the rate at which the water level in the well declines. Results are used to determine hydraulic conductivity,or the ease with which the materials exposed in the well can transmit water.

Transmissivity is the rate ($length^2$/time) at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient. The storage coefficient is the volume of water that an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in piezometric head. Hydraulic conductivity is a measure of the rate of water movement through soil. It is a coefficient which depends both on the properties of the porous medium and the fluid and has units of velocity. Permeability is a property of the porous medium only and has the units of $length^2$. Transmissivity, storage coefficient, and permeability are termed aquifer constants, and serve to characterize the hydraulic properties of water-bearing zones.

The terms and concepts presented here are intended to aid comprehension of the following sections. Certain other technical terms are defined, as needed, in the text.

SECTION 2

LITERATURE REVIEW

Limited literature searches were conducted before field operations began, and again after field operations were completed. The pre-field operations search was aimed at obtaining general background information on the Canal, and the geology of the area which was needed to plan the study. The post-field search was aimed at obtaining specific technical information which was needed to supplement the data collected in the field. These searches were limited by time constraints imposed both before and after the field investigation. Searches were planned using documents held in JRB/SAI's in-house library, and documents obtained from GCA and EPA.

Both searches were conducted primarily at four libraries in the Washington D.C. metropolitan area. These libraries are:

- The Environmental Protection Agency Library
- The U.S. Geological Survey (USGS) Library
- The National Agricultural Library
- The U.S. Department of Interior Natural Resources Library.

Literature search activities were concentrated at the first two libraries. The EPA Library proved to be the best source of data on Love Canal, and the USGS Library proved to be the best source of data on the geology and hydrogeology of the Niagara Falls area. Several individuals were also contacted to supplement information contained in published reports. These individuals are listed in Table 2.

Geologic studies of a specific nature that have been conducted in the region include those by Grabau (1901), Cannon (1955), Bolton (1957), and Johnston (1964). The most comprehensive overall geologic discussion is given by Kindle and Taylor (1913). Reports on Love Canal obtained during this search include: Interagency Task Force on Hazardous Waste Disposal (1979); New York State Office of Public Health (1978); Clement Associates (1980); Ember (1980); and Kim, et al. (1980). These reports were the main sources of information used to develop this section.

GEOLOGY

The Love Canal area is situated in a region that has been subjected to several advances and retreats of continental glaciers during the Pleistocene Epoch (approximately two million years ago). These advances and retreats of ice have left a nearly flat terrain (see Physiography). Glacial lakes bordering the ice sheet deposited silts and clays over till (an unsorted mixture of boulders, clay, and sand), which was laid down by the glacier as it advanced.

Table 2. Personal Contacts Made by JRB/SAI During the Literature Search

Joseph Slack
Kernan Davis
Division of Solid Waste
New York State Department of Environmental Conservation
Albany, New York

C. Stephen Kim
Toxicology Insitute
Division of Laboratories and Research
New York State Department of Health
Albany, New York

Richard Johnston
James Hunt
U.S. Geological Survey
Ithaca, New York

Frank Rovers
Conestoga-Rovers and Associates
Waterloo, Ontario

Ed Gurche
Water Levels Branch
National Oceanographic and Atmospheric Administration
Rockville, Maryland

William Shaw
Jack Lusch
U.S. Army Corps of Engineers
Detroit, Michigan

The till in the study area, which is locally called stony hardpan, is particularly compact, and acts to prevent mixing of water between the lake deposits and bedrock. The main bedrock unit of interest in the study area is the Lockport Dolomite of the Silurian Period (approximately 395 to 440 million years ago). Beneath the Lockport is another Silurian unit called the Rochester Shale. This shale also acts as a confining layer. As a result, there are two distinct aquifers--the unconcolidated lake deposits and the Lockport Dolomite. These two units were the focus of this hydrogeologic evaluation. Additional information on the geologic materials in the area appears in Johnston (1964) and Kindle and Taylor (1913).

Bedrock

The Lockport Dolomite of the Middle Silurian age is a massive (unlayered) to thinly-bedded sedimentary rock characterized by vugs (cavities), fractures, and secondary mineral deposits. It ranges from dark gray to brown over most of its extent, with some light gray, coarse-grained limestone near the base. The Lockport Dolomite consists of five distinct lithologic (rock) types that are, from top to bottom:

- Brownish-gray, coarse- to medium-grained dolomite, locally saccaroidal (granular crystalline) with thin intervals of undulatory (curved) bedding
- Gray to dark-gray, fine-grained dolomite, containing abundant carbonaceous partings
- Tannish-gray, fine-grained dolomite
- Light-gray, coarse-grained limestone containing abundant crinoid (sea lily) fragments
- Light-gray, shaly dolomite, laminated (thinly layered) in part (Johnston, 1964, p.21).

The depth of the Lockport Dolomite in the study area ranges from 6 to 12 meters (20 to 40 feet) below land surface, and is 49 to 55 meters (160 to 180 feet) thick. However, along the Niagara escarpment to the north, it has been eroded to a thickness of about 6 meters (20 feet). The nearest outcrop is in the Niagara Gorge, where the Lockport forms the caprock of the Falls. The unit also crops out near Lockport to the east of Niagara Falls, where it probably receives a good deal of its recharge.

Calcite (calcium carbonate) and gypsum (calcium sulfate) are found in the Lockport as primary and secondary deposits in vugs and fractures. Pyrite (iron sulfide), sphalerite (zinc sulfide), and galena (lead sulfide) are found as particles disseminated throughout the formation.

Ground water in the Lockport Dolomite moves primarily through fairly large openings, rather than through microscopic pores in the rock (as it might in a sandstone). The three types of openings that transmit water are near-horizontal bedding planes, vertical fractures, and irregularly-shaped cavities. Of these, the bedding planes transmit most of the water in the Lockport.

Bedding planes are formed as earth materials are deposited, usually in a body of water. When these materials solidify into rock, the bedding planes persist as thin separations. In the Lockport, the bedding planes are typically open less than 3 millimeters (1/8 inch), but they have been known to be continuous laterally for as much as 6.5 kilometers (4 miles). Consequently, they provide very effective conduits for ground water.

Fractures are usually formed by stresses in the earth after a rock has solidified. Fractures typically appear in sets (i.e., many individual fractures that are parallel to one another over a large area). In the Niagara Falls area, there are two prominent sets of vertical fractures, one oriented at N65E (65 degrees east of north), and another oriented at N30W (30 degrees west of north). These fractures are open only in the upper 3 to 4.5 meters (10 to 16 feet) of the Lockport, and are not very important water bearing zones below this level.

Both the bedding planes and the fractures were probably enlarged when the continental ice sheet receded from the area about 10 to 15 thousand years ago. This is because an enormous amount of weight was taken off the rock as the ice melted, so that the separations could expand. These openings expand in much the same way as the holes in a sponge expand when the sponge is squeezed and then released. This release of pressure from the overlying ice probably also created new separations in the rock, especially in the upper part of the formation.

Cavities are holes in rock formed when water dissolves soluble mineral accumulations. In the Lockport, cavities were formed by the solution of small calcite and gypsum deposits, and range in size from 1 millimeter (1/25 inch) to 130 millimeters (5 inches). These cavities increase the rock's ability to store water (porosity), but have little effect on its ability to transmit water (permeability) unless they are connected by bedding planes or fractures.

The bedding planes, fractures, and cavities in the Lockport have all been enlarged by solution. Ground water moving through these openings dissolves deposits of soluble materials, such as gypsum and calcite, and to a certain extent, the dolomite as well. This dissolution has widened the openings in the upper 30 meters (100 feet) of the Lockport, especially in the upper 5 meters (16 feet). These enlarged openings transmit water more effectively than do the restricted openings in the lower part of the formation. As a result, there are two distinct water-bearing zones in the Lockport near Love Canal:

- A moderately permeable zone at the top of the dolomite which is generally 3 to 5 meters (10 to 16 feet) thick, and is characterized by both vertical fractures and bedding planes which have been enlarged by solution.

- The lower 49 to 55 meters (145 to 170 feet) of the formation which is essentially impermeable, except for seven distinct zones having well-developed bedding planes.

(Most of the bedrock wells installed during this investigation penetrated only the upper water-bearing zone.)

Well yields in the Lockport depend primarily on the zones that the well penetrates. The average yield of wells in the upper and middle parts of the formation, which includes the upper zone and 4 of the 7 lower zones mentioned above, is 117 liters (31 gallons) per minute. By contrast, the average yield from wells in the lower 12 meters (40 feet) of the formation, which includes only three of the water-bearing zones mentioned above, is 26 liters (7 gallons) per minute (Johnston, 1964, p.29). The transmissivity of each of the two major zones is about 40,000 square meters per day (500 gallons per day per foot), even though the lower zone is over ten times thicker. The transmissivity of the entire formation is about 80,000 square meters per day (1,000 gallons per day per foot) (Johnston, 1964, p.36).

Ground water from the Lockport is very hard and typically high in calcium, magnesium, sulfate, and bicarbonate. These constituents reflect the dissolution of calcite (calcium carbonate), gypsum (calcium sulfate), and the dolomite (calcium, magnesium carbonate) by the ground water. Although gypsum is much less prevalent than dolomite, it is more soluble, so that the Lockport's water is highly sulfurous and quite foul-smelling. The hardness and mineral content of this water makes it unsatisfactory for most uses without treatment (Johnston, 1964, p.37).

Overburden

For the purposes of this report, the term overburden refers to all unconsolidated materials overlying bedrock. This term includes the till; the lake clays, sands, and silts; any natural soils; and all fill material.

Nearly all of the land within the study area has been disturbed by humans to such an extent that little of the material encountered at the surface is in a natural state. Moreover, because of the disturbances, most of the minor surface drainage has been obscured by fill material. The fill used ranges from local soil material to construction rubble and industrial wastes. In the last category, coarse-grained carbon wastes and a black, tar-like substance have been found, mainly in the 93rd Street schoolyard. The thickness of the fill ranges from about 8 centimeters (a few inches) on high ground to about a meter (several feet) in old drainage ways.

There are three distinct, naturally occurring, unconsolidated units in the area: a moist, but firm, silty-clay unit near the surface; a wet, soft, silty-clay unit; and the very firm, low-permeability, glacial till. The two clay units are deposits of former glacial lakes Tonawanda and Dana. Glacial Lake Dana deposits are characterized by the fine-grained sediments overlying the glacial till, and the glacial Lake Tonawanda deposits are characterized by the somewhat coarser sediments above glacial Lake Dana deposits.

The glacial lake deposits are primarily clays with some silt, and local lenses of silty-sand. These materials were derived from different source rocks, which resulted in variegated (multicolored) and varved clay layers. The variegated clays are primarily shades of red, green, and gray. These clays derive their color from their parent rocks that overlie the Lockport Dolomite to the north. Varved clay refers to the separation of thin clay layers by thin layers of very fine sand or silt. Varved clays are a result of the alternate deposition of fine and coarse materials in standing water during alternate periods of freeze and thaw in glacial lakes.

These deposits also contain lenses of sand, or sand and gravel, as a result of stream deposition. The clays are typically cohesive, somewhat plastic (tend to flow under pressure), and of very low permeability. Where exposed at the surface, dehydration can occur, and polygonal cracking to depths of a meter (several feet), can result. These cracks are a significant route for ground-water movement in the overburden. Heavy rains subsequent to such cracking may account for the presence of soft saturated clays, seemingly isolated from surface water and deeper ground water, by relatively dry, hard clay above and dry, hard till below.

The natural materials underlying the surface fill show considerable stratification (layering) and variation. In general, glacial Lake Tonawanda deposits consist of a 1- to 2-meter (3- to 6-foot) layer of reddish brown and reddish gray, somewhat moist, firm, varved, silty-clay to clay. Below this firm silty clay, the glacial Lake Dana deposits consist of a 1- to 6-meter (2- to 20-foot) layer of a reddish brown, very moist to wet, very plastic, very sticky, silty-clay to clay.

Below the lake deposits is the glacial till which consists of a reddish brown, firm, silty clay matrix, surrounding rounded and sub-rounded gravel and cobbles of dolomite, shale, and igneous and metamorphic rock fragments. In a few areas, the matrix of the till is a sandy clay. In other areas, the till is underlain by a gravel-free, reddish-brown, firm, silty clay. The thickness of the glacial till generally ranges from 5 meters (16 feet) in the north, to 8 meters (26 feet) in the south, with relative thinning to the west.

The glacial lake clays have an extremely low permeability, and yield little water to wells. The thin sand lenses, however, have a much greater permeability. Wells that tap only the clays yield less than 380 liters (100 gallons) per day. Wells tapping sand lenses yield more water, and are usually adequate for domestic or very small agricultural needs. The permeability of the clays is about 0.002 darcey (0.04 gallons per day per square foot). The till is also quite impermeable, having a permeability of about 1.3 darceys (23 gallons per day per square foot), and probably much less than that (Johnston, 1964, p.467). Consequently, water movement through these zones is fairly restricted, except through the sand lenses and dehydration cracks.

Ground water in the overburden is very hard, but not as highly mineralized as water in the bedrock. Calcium and bicarbonate are the primary ions, and some areas have moderately high chlorides and sulfates (Johnston, 1964, p.45).

LOVE CANAL

Love Canal's early history was described in Section 1. The circumstances that led to developing and implementing this study, which represents one of the final steps in assessing the problems at the Canal, are described below.

Between 1942 and 1943, Hooker Chemical began dumping large quantities of hazardous wastes in the Canal. Table 3 lists the types of wastes and their estimated quantities. In 1958, problems began occurring in the form of chemicals at the surface of the Canal. By 1978, the area had been declared a Federal disaster area. Based on studies which hypothesized how contaminants may have escaped from the site, remedial measures were implemented to prevent any further leachate migration. Table 4 outlines the events which led to JRB/SAI's study.

Hypothesized Contaminant Routes

Previous studies on contaminant migration from Love Canal have focused on leachate movement in the overburden, probably because the surface manifestations were so blatant. Kim, et al. (1980, p.213) describes the situation as follows:

> The Love Canal never became the park that had been promised to the neighborhood. The southern section retained a scarred, blighted appearance, further aggravated by subsidence of the fill and by surfacing of barrels. Corrosion of barrels caused the surface to give way in a number of places, exposing chemical wastes. By the mid-1970's, chemical odors (caused by volatilization of surface chemical wastes) were cited by residents as a source of discomfort and complaints.
>
> High groundwater levels during this period caused chemically contaminated wastes to surface and migrate overland into backyards. These events apparently drew attention to underground migration that had been occurring over the years and was manifested by an oily coating in the sumps of some houses that directly adjoin the Canal (first ring). For some first-ring houses with contaminated sumps and cinder-block foundations, there was evidence of chemical infiltration through the foundations.

But why it had taken nearly 30 years for contaminant migration to become evident, still remained a question.

Several investigations of the area conducted by Calspan Corporation (1977), Conestoga-Rovers and Associates (1978), and Clement Associates (1980), suggested an answer to the question. According to their hypothesis, the Canal filled gradually over the years with water which had infiltrated through the soil cover. Because the materials into which the Canal was excavated were so impermeable (as evidenced by the fact that the excavation served as a local swimming hole for the decade before dumping began), fluids in the site

Table 3. Estimated Quantities of Hazardous Wastes in Love Canal*

Type of Waste	Estimated Quantity	
	Metric Tons	Short Tons
Hexachlorocyclohexane (including lindane, benzene hexachloride, and hexachlorobenzene	6,300	6,900
Benzylchlorides (including benzyl chloride, benzyl alcohol, and benzyl thiocyanate	2,200	2,400
Dodecyl, mercaptans, chlorides, and miscellaneous organic sulfur compounds	2,200	2,400
Sodium sulfides and sufhydrates	1,900	2,100
Chlorobenzenes	1,800	2,000
Miscellaneous chlorination products (including naphthalenes, anilines, waxes, and oils)	900	1,000
Benzoylchlorides and benzotrichlorides	730	800
Liquid disulfides and chlorotoluenes	630	700
Thionyl chloride and miscellaneous sulfur and chloride compounds	450	500
Miscellaneous acid chlorides (including acetyl, caprylyl, butyryl, and nitro benzoyls but not benzoyl chloride)	360	400
Metal chlorides	360	400
Trichlorophenol	180	200
Miscellaneous chemical wastes	1,800	2,000

*After Interagency Task Force on Hazardous Waste Disposal, 1979, p. III-72.

Table 4. Chronology of Events Leading To This Investigation of Love Canal*

1942	The Niagara Power and Development Company allowed the Hooker Electrochemical Company to dump chemical wastes in the abandoned Canal.
1947	Hooker bought the property from the Niagara Power and Development Company and continued to dump wastes there.
1953	Hooker ceased dumping wastes into the Canal and deeded the property to the City of Niagara Falls Board of Education.
1954	The Board of Education began construction of the 99th Street elementary school. Residential development also began.
1958	Three children suffered burns from residues at the surface of the Canal while playing there.
1959	First apparent evidence of leachate from the Canal appeared when a black ooze seeped through the basement walls of a house on south 99th Street.
1976	New York's Department of Environmental Conservation found halogenated hydrocarbons in sewers adjoining the Canal.
1977	Several years of heavy precipitation apparently caused leachate to surface at a quickening rate. The City of Niagara Falls began planning a remedial program.
April 25, 1978	Dr. Robert P. Whalen, New York State Health Commissioner, said "conditions at the site represent a serious threat to human health" and ordered the county health commissioner to remove exposed chemicals, install a fence to restrict access, initiate immediate health studies, and take other appropriate measures to protect the health of residents and correct the environmental problems.
May 15, 1978	The U.S. Environmental Protection Agency concluded from air sampling of basements that levels of toxic vapors suggested a serious health threat.
June 19, 1978	The State Health Department medical investigators began a house-to-house health survey of residents living in first ring of homes and also collected blood samples for laboratory analysis.
June 25, 1978	The State Health Department's Division of Laboratories and Research began collecting air samples outside the homes adjacent to the Canal.
July 7, 1978	Health Department researchers issued the results of air samples collected from basements and other rooms of homes which showed high levels of toluene, chlorotoluene, and chloroform.

continued--------

Table 4. (Continued)

August 1, 1978	Commissioner Whalen ordered an extension of the house-to-house health survey to include residents within surrounding blocks and also announced plans to trace individuals who had lived in the area over the last 30 years.
August 2, 1978	Commissioner Whalen, acting under additional authority granted him by the new legislation, declared that a state of emergency existed at the Love Canal site, and issued orders to Niagara County, the City of Niagara Falls, and the Niagara Falls School District reaffirming previous directives. He also issued new orders which included closing the 99th Street school pending completion of corrective construction, and making a series of recommendations concerning evacuation of pregnant women, and children under two years of age living in homes in the first two rings.
August 9, 1978	Governor Carey announced that the State had decided to evacuate all 237 families living on both sides of 97th and 99th Streets.
August 18, 1978	State Health Department medical investigators and technicians from Roswell Park Memorial Institute in Buffalo completed two weeks of drawing blood samples from more than 2,200 area residents, which brought the total to more than 2,800 persons since testing began in June.
August 22, 1978	Installation of an 8-foot high chain link fence around the second ring of homes began, preparatory to the start of corrective construction.
Oct. 15, 1978	Remedial construction began under the direction of Conestoga-Rovers and Associates of Waterloo, Ontario.
March 1979	New York's Interagency Task Force on Hazardous Wastes issued a report on hazardous waste disposal in Erie and Niagara Counties which gave estimates of the quantities of wastes placed in the Canal by Hooker (see Table 3).
Dec. 7, 1979	The Love Canal Treatment Plant began processing leachate collected from the Canal area.
August 20, 1980	JRB/SAI and GCA began implementing EPA's geotechnical assessment and ground-water monitoring program.

*Compiled from information in New York State Office of Public Health (1978), Ember (1980), Brown (1979), Zuess (1981), and Glaubinger, et al. (1979).

remained there rather than percolating into the ground water. However, when the Canal filled to about two meters (six feet) from the land's surface, the fluids overflowed into the more permeable fill materials overlying the clays. (This process has been likened to that of an overflowing bathtub.)

Once leachate entered the permeable surface fill materials, it was free to follow several different migration routes. The most important routes identified by previous studies include:

- Swales and sand lenses
- Sewer lines and other man-made features
- Dehydration cracks in the clay deposits.

Drainage patterns in the Love Canal area were mapped from aerial photos by Cornell University, and published in a report for New York's Department of Environmental Conservation by Geotechnics and Resources, Inc. (1961). This report cited swales as a major source of subsurface water movement. Swales are old streambeds or low-lying areas that at one time probably carried surface water. During the development of the area, these swales were filled in with permeable materials, making them excellent conduits for leachate migration from the site. (Figure 5 shows the locations of the five major swales that have been identified in the area.) Furthermore, in excavating a trench for the leachate collection system, a barrel was found near 97th Street in the one major swale that crosses the Canal (swale #1 in Figure 5). The barrel was empty, but covered with black, foul-smelling leachate. Borings in the swale revealed that the entire area contained the chemical ooze (Clement Associates, 1980, p.76).

Sand lenses have also been found in the area that offer preferential pathways for leachate migration. However, these deposits are generally small, discontinuous features that are scattered in the clays and till throughout the area, and are therefore, difficult to locate and map. Nevertheless, when leachate does enter these sand deposits, they provide an excellent route for contaminant movement, just as do the swales.

Sewer lines, pipelines, and foundations have also been cited as routes for leachate migration. According to Kim, et al. (1980, p.218):

> A single-day sampling (during April 1979) of all storm-sewer manholes revealed two major contaminant entry points: in the north a tile drain system at 953 97th Street with a catch basin on the Love Canal, and in the south a French drain west and south of the 99th Street school. Such contaminant migration through storm sewers is obvious from the aromatic, oily sediments at the 96th Street outfall into Black Creek.

Furthermore, a number of foot drains and illegal pipes from the homes on 97th Street near the major swale were found during excavations for the leachate collection system. Each of these pipes contained the black Love Canal leachate

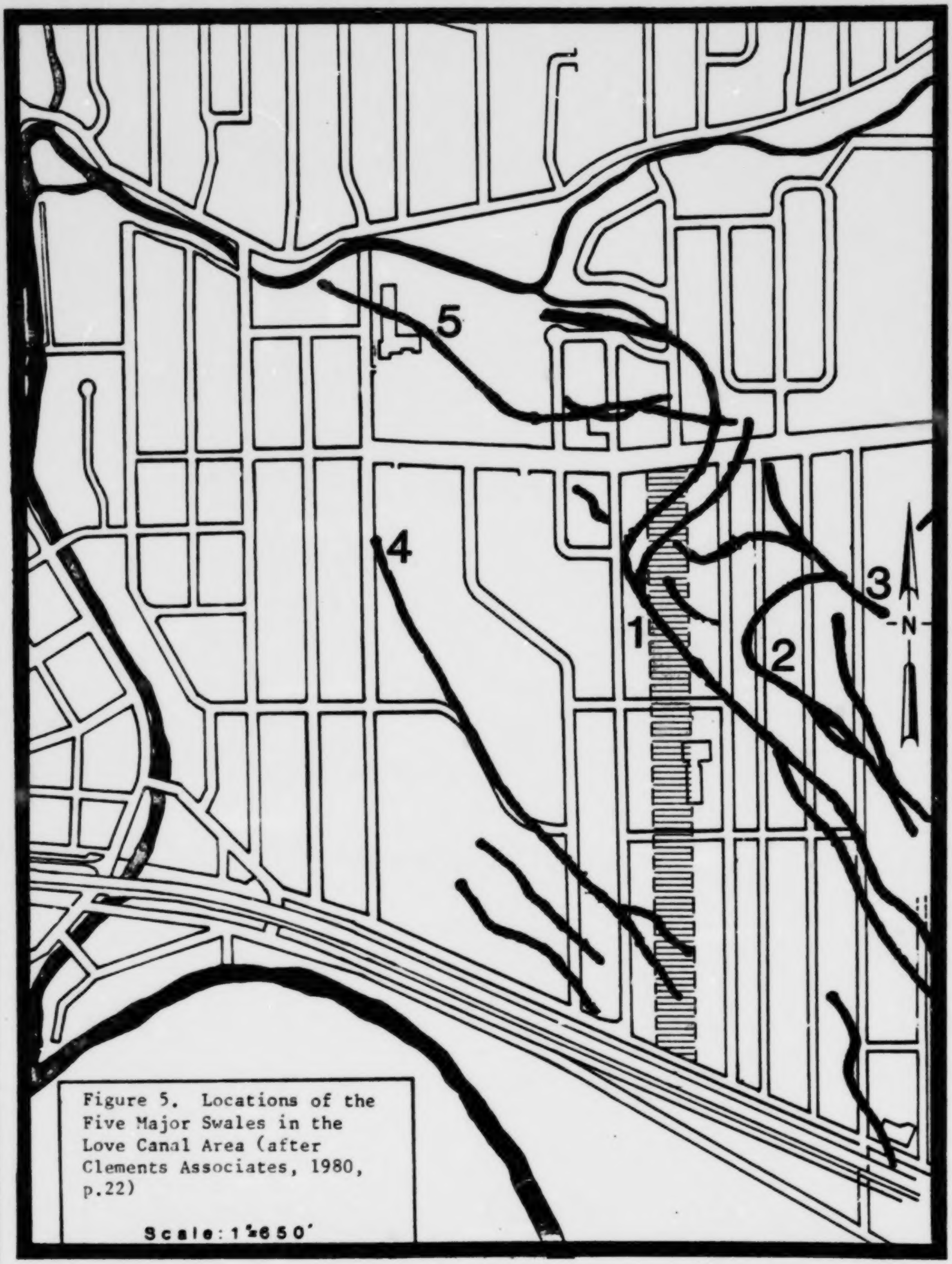


Figure 5. Locations of the Five Major Swales in the Love Canal Area (after Clements Associates, 1980, p.22)

which probably drained into the nearby sewers (Clement Associates, 1980, p.81). Since the material used to backfill the sewer trenches is also more permeable than the surrounding materials, wastes migrate outside the lines as well. Clearly then, the sewers bordering the Canal have transported contaminants away from the site and into Black Creek and the Niagara River.

Considering the "bathtub" hypothesis described previously, and the effects that these high-permeability routes have on leachate migration, it is easy to explain why contaminants seemed to move directly towards the homes bordering the site. When the Canal (the "bathtub") overflowed, leachate entered the permeable surface fill materials and then followed swales, sand lenses, and sewer lines directly to the foundations of homes bordering the site. Since the foundation excavations were also backfilled with more permeable materials, the leachate could surround the structures. Once there, it was only a matter of time before the leachate began to seep through. In fact, New York's Office of Public Health (1978, p.8) verified that homes with solid, poured-concrete foundations had lower contamination levels in their basements than homes with block foundations. This condition was probably not caused by less leachate being near certain homes, rather, the poured foundations were slightly more impermeable than the block foundations.

Another contaminant transport route identified in previous studies involves the movement of affected soils by wind erosion and construction activities. The quantity of contaminated soil transported by wind is probably minor compared to the quantity of soil that was moved during residential development. Many of the isolated pockets of soil contamination identified in the area probably occurred because of earth moving activities during construction.

These pathways provide quite a number of mechanisms for leachate to move horizontally away from the Canal. It was thought that contamination would, as a result, be restricted to the permeable zone above the lake clays. However, in excavating for the leachate collection system, dehydration (drying) cracks were found in the clays that could transport leachate downward towards bedrock. According to Clement Associates (1980, p.49):

> These dehydration cracks were found to exist in the (glacial Lake Tonawanda clays) throughout the entire canal area. This was significant because these cracks were coated with a brown-black oil, which was identified as the "Love Canal leachate." This clearly indicated that disposed chemicals had migrated vertically through the...clays, and that chemicals pass rather easily through these cracks.

Consequently, leachate could migrate in all directions from the Canal whenever the site overflowed into the permeable surface material.

Nevertheless, there was still some disagreement as to the primary routes of leachate migration. Most studies agree that underground utilities are a major pathway, but Clements Associates (1980, p.4) also cite the major swales, dehydration cracks, and sand lenses as direct routes for migration. In contrast, Kim, et al., (1980, p.218) found no evidence to support the hypothesis that the cracks, swales, and sand lenses are, in fact, major leachate movement routes. They concluded:

> Evidence of through-ground transport of chemical wastes appears limited to the first ring of homes, except along the permeable fill around utility lines under Frontier Avenue. Transport of contaminated soils and dusts has occurred through the use of Canal soils for fill material. Undoubtedly, windborne dusts and vapors served as mechanisms of transport prior to remedial construction. Waterborne transport of chemicals before filling of the swales remains a possibility, although as yet no chemical evidence exists to support this mechanism. The storm sewers to the north and south transported Love Canal wastes to Black Creek and the Niagara River.

One of the goals of this study, then, was to collect data which would resolve this disagreement.

Remedial Actions

To mitigate the hazards posed by the wastes in the Canal, the City of Niagara Falls directed a program to construct a leachate collection system around the Canal and a clay cap over it. Conestoga-Rovers and Associates of Waterloo, Ontario, designed the remedial construction plan. Construction at the Canal proceeded in two phases. Phase I consisted of remedial construction at the southern third of the Canal and took place from October 1978 to February 1979. Phase II consisted of construction at the remaining two-thirds of the Canal, the central and northern sections, and took place from June to December 1979. Phase I was carried out by Newco Chemical Waste System, Inc., now called Chemical Environmental Conservation Systems (CECOS). Phase II was carried out by Albert Elia Building Company (Clement Associates, 1980, p.13).

The remedial actions taken at the Canal were designed to meet five objectives:

- Lower the water table in the Canal
- Minimize rain and snow water infiltration into the Canal
- Collect all leachate migrating laterally from the Canal, and as much leachate as possible from outside the first ring of houses
- Control odors and emissions of volatile contaminants
- Make the site more aesthetically pleasing.

Lowering the water table in the Canal could reduce or eliminate contaminant migration through the permeable fill materials and other transport routes. Minimizing infiltration into the Canal would also minimize the quantity of leachate produced. Collecting leachate already in the ground-water system would reduce contaminant levels in the vicinity of the Canal. Finally, controlling emissions of volatile contaminants would probably contain the wastes in the site so that they were no longer a substantial threat to human health.

To accomplish these objectives, Conestoga-Rovers and Associates developed a remedial construction plan that involved installing a leachate collection system around the Canal and a clay cap over it. The leachate collection system would lower the water table in the Canal and collect contaminated ground water in the vicinity of the system. The clay cap would control odors and minimize the amount of water that could infiltrate into the Canal. Eventually, the clay cap could also be covered with topsoil and seeded to make it more attractive.

According to Clements Associates (1980, p.20ff), the leachate collection system consists of a trench 4.5 to 7.5 meters (15 to 25 feet) deep, and 1.2 meters (4 feet) across, which borders the Canal on all sides. A perforated clay pipe 20 centimeters (8 inches) in diameter and surrounded by crushed stone sits about 0.3 meter (one foot) up from the bottom of the trench. The upper portion of the trench is filled to the surface with sand. The clay pipe is graded towards a series of manholes and deep wells. Fluids collected in these wells are then pumped to one of two 95,000 liter (25,000 gallon) holding tanks located at the site. As a holding tank fills, the leachate is pumped to the Love Canal treatment plant, where the leachate is clarified by settling, and then passed through activated carbon. The sludge that settles out in the clarifying tanks is placed in barrels and buried in a waste disposal site in Niagara Falls. The spent activated carbon is burned in a high-tempterature incinerator. The effluent is discharged into the city sanitary sewer system, where it is treated again at the waste water treatment plant. The clay cap consists of approximately 1 meter (3 feet) of clay at the apex with gradual tapering at the sides. Over the tile drain system there is approximately 0.3 meter (1 foot) of clay.

FOCUS OF THE JRB/SAI STUDY

Based on the background information obtained in the literature review, JRB/SAI and GCA defined two fundamental questions to be answered by this study:

- What barriers to, and routes of, contaminant migration exist in the study area?
- How severely is the bedrock and the overburden in the study area contaminated?

These questions were the focal point of all field activities, and in turn, were the basis for defining additional questions concerning contaminant migration from the Canal.

Ground-water samples collected from all wells installed during this study were analyzed for EPA's 129 priority pollutants as well as several other chemical parameters. However, the results of these analyses were not available at the time this report was in preparation. These results will be presented in a report to be issued by EPA's Robert S. Kerr Environmental Research Laboratory in Ada, Oklahoma. Consequently, this report focuses on potential geologic barriers to, and routes of, contaminant movement. The results of JRB/SAI's field activities (except for ground water sampling) appear in Section 4.

SECTION 3

METHODS

Methods of installing, testing, and sampling the ground-water monitoring wells at Love Canal were developed especially for this study because of the potentially hazardous nature of the work. The health and safety of personnel involved in the investigation was at all times of primary concern. Equipment utilized and procedures followed in all phases of the investigation were oriented around this concern.

Five detailed sets of field procedures were developed for the study. These procedures were prepared for:

- Monitoring well installation
- Aquifer testing
- Ground-water sampling
- Sample documentation
- Worker health and safety.

The procedures followed for these activities are described in this section. In addition, JRB/SAI conducted a search for background information on the area to augment data collected in the field. The procedures followed for the literature search are described in Section 2.

ROLE OF THE SUPERVISORY GEOLOGIST

JRB/SAI's role in the project was to provide supervisory geologists to oversee monitoring well installation, aquifer testing, and ground-water sampling in the Canal area. Each field activity, such as installing a monitoring well at a preselected site, was observed and directed by at least one supervisory geologist. The role of these personnel was basically to ensure high-quality implementation of the study plan. In particular, the supervisory geologists were responsible for:

- Collecting sound scientific data on the hydrogeology of the area during all activities.
- Ensuring that the well drillers (Empire Soils Investigations, Inc. of Orchard Park, New York) installed the monitoring wells at the designated locations and screened them in the appropriate geologic horizon.

- Documenting all activities, especially the sequence of geologic material encountered during drilling at each site and the details of individual well construction. (Well logs and as-built diagrams appear as Appendix H.)

- Directing the efforts of JRB/SAI's sampling team when sampling at sites where work was ongoing.

- Ensuring that all persons conducting or observing any field activities followed the worker health and safety procedures described later in this section.

All supervisory geologists reported to the Field Operations Supervisor who, in turn, reported to the Project Manager. The chain-of-command for the field operations is illustrated in Figure 6.

MONITORING WELL INSTALLATION

The monitoring well installation procedures were designed especially for installing wells in contaminated areas. The major objectives of the procedures were to:

- Complete monitoring wells so that samples could be taken

- Ensure that the bedrock and overburden aquifers were sealed off from one another, thus preventing any cross-contamination

- Obtain accurate geologic and hydrologic information regarding the characteristics of these water producing zones

- Ensure that worker health and safety was not jeopardized.

The procedures followed to meet these objectives are presented in the following sections in a format similar to that which was presented to field personnel.

Site Preparation

Prior to installing any ground-water monitoring wells, a complete inventory of the site was performed. This inventory included:

- Obtaining owners' written permission to install wells on their property

- Locating and verifying the existence of any utilities in the area

- Staking the proposed borehole location

- Drawing a detailed sketch map of the site.

The sites selected for well construction were based primarily on reported areas of contamination, and on reported locations of pre-development drainage

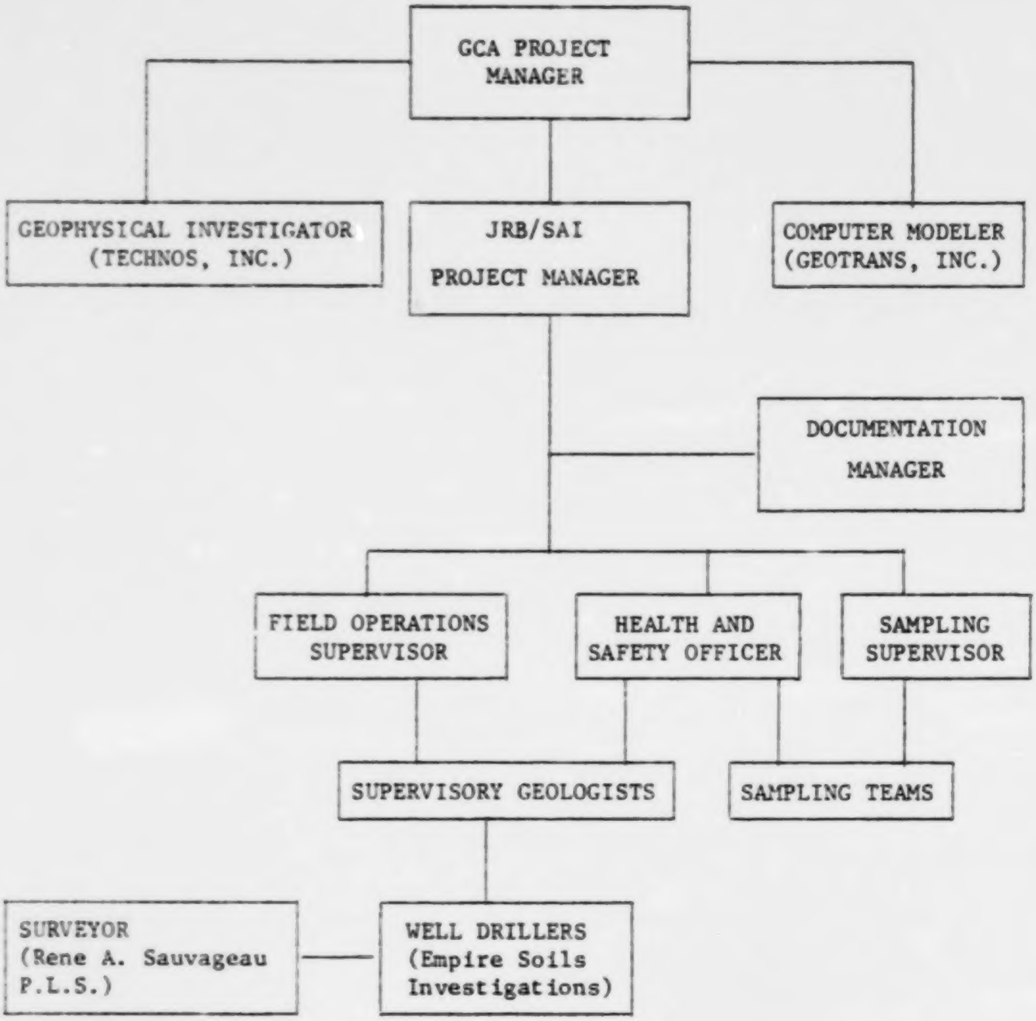

GCA PROJECT MANAGER
GEOPHYSICAL INVESTIGATOR (TECHNOS, INC.)
JRB/SAI PROJECT MANAGER
COMPUTER MODELER (GEOTRANS, INC.)
DOCUMENTATION MANAGER
FIELD OPERATIONS SUPERVISOR
HEALTH AND SAFETY OFFICER
SAMPLING SUPERVISOR
SUPERVISORY GEOLOGISTS
SAMPLING TEAMS
SURVEYOR (Rene A. Sauvageau P.L.S.)
WELL DRILLERS (Empire Soils Investigations)

Figure 6. Field Organization for the Geotechnical Assessment Portion of the Love Canal Investigation

ways such as sand lenses or swales. Additional site selection criteria included whether permission was granted for site access by the owner, and whether geophysical anomalies were identified by Technos, Inc. of Miami, Florida. Well sites were selected by Craig Shew and Jerry Thornhill of EPA's Robert S. Kerr Environmental Research Laboratory in Ada, Oklahoma; Dave Twedell and Larry Cerrillo of JRB/SAI; and David Cogley and Bob Bouchard of GCA. Only the T-well site was selected solely for the purpose of obtaining hydrogeologic data. Attempts were made, however, to obtain the maximum amount of data from every well.

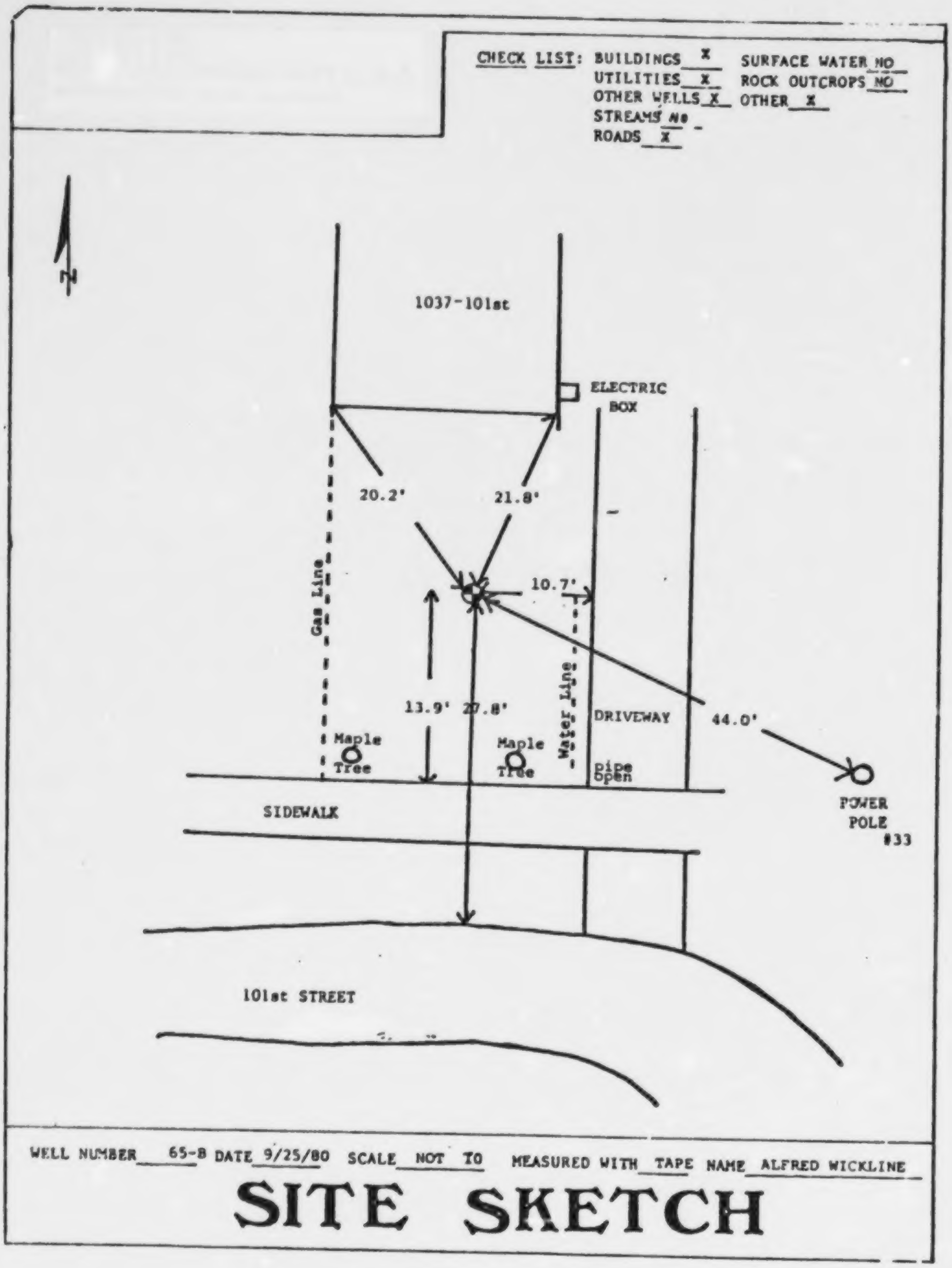
The specific activities conducted by JRB/SAI to complete the site preparation inventory were:

1. Obtain a signed permission slip from the owner of the site prior to entering the property (this was done primarily by EPA and GCA).
2. Have representatives of all utilities mark the location of any structures on the property, and obtain a written clearance from them.
3. Mark the candidate drilling site with a labeled wooden stake and flagging, making sure that it will not interrupt any underground utilities and is not beneath any power lines, and that the drilling rig can access the site.
4. Determine if any pipes are located beneath the candidate drilling site using a pipe locator. If any pipes are suspected, restake the site repeating steps 3 and 4. (The purpose of this step was to ensure that "forgotten" or undocumented pipelines would not cause any problems.)
5. Measure with a measuring tape and record on the Sketch Map (see Figure 7) all permanent landmarks. (This step was to ensure that the stake location would be recorded if the stake were lost.)

Once the inventory was complete, JRB/SAI's Project Manager would review the results and complete a Work Authorization Form (see Figure 8). The Field Operations Supervisor would then take the forms and assign a drilling team to the site based on its priority. Priorities were agreed upon by EPA, GCA, and JRB/SAI.

Well Installation

Five types of wells were installed during this investigation: overburden wells called "A-wells;" shallow bedrock wells called "B-wells;" deep bedrock wells called "C-wells;" medium-depth bedrock wells called "D-wells;" and slug test wells called "T-wells." A-wells were screened in the silty clays to monitor contaminant levels in the overburden above the till. B-wells were drilled 1.5 meters (5 feet) into bedrock to monitor contaminant levels in the upper portion of the Lockport Dolomite. C-wells were drilled to the bottom of the Lockport Dolomite and into the Rochester Shale (typically about 52 meters (170 feet) into bedrock) to determine the thickness,



CHECK LIST: BUILDINGS X SURFACE WATER NO

UTILITIES X ROCK OUTCROPS NO

OTHER WELLS X OTHER X

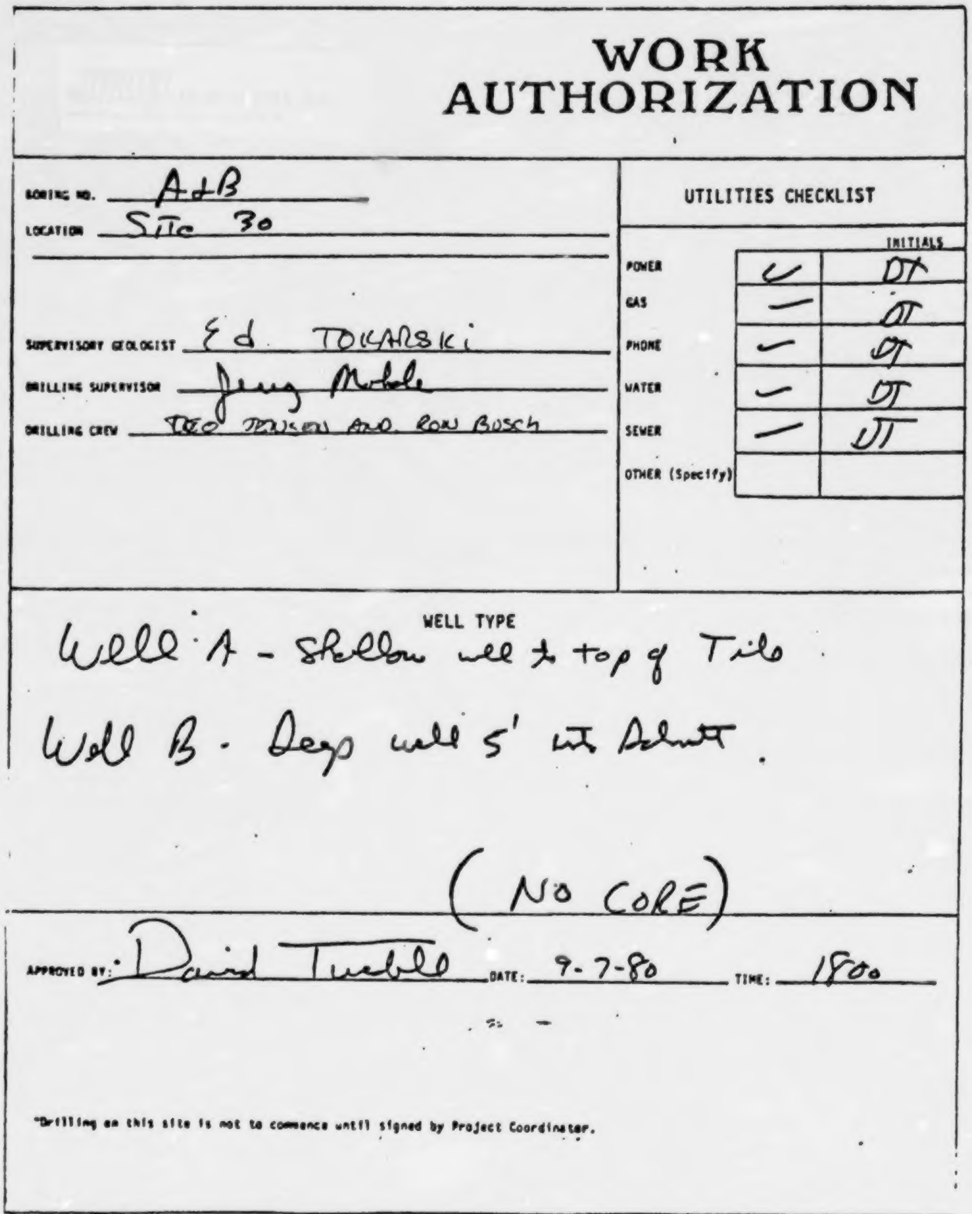
STREAMS NO

ROADS X

WELL NUMBER 65-B DATE 9/25/80 SCALE NOT TO MEASURED WITH TAPE NAME ALFRED WICKLINE

SITE SKETCH

Figure 7. Sample Site Sketch.



WORK AUTHORIZATION

BORING NO. A&B

LOCATION Site 30

SUPERVISORY GEOLOGIST Ed TOKARSKI

DRILLING SUPERVISOR Jerry Moble

DRILLING CREW TED JENSON AND RON BUSCH

UTILITIES CHECKLIST

		INITIALS
POWER	✓	DT
GAS	✓	DT
PHONE	✓	DT
WATER	✓	DT
SEWER	✓	DT
OTHER (Specify)		

WELL TYPE

Well A - Shallow well to top of Till.

Well B - Deep well 5' into Dolomite.

(NO CORE)

APPROVED BY: David Truebl DATE: 9-7-80 TIME: 1800

*Drilling on this site is not to commence until signed by Project Coordinator.

JRB-600/02

Figure 8. Sample Work Authorization.

stratigraphy, and geologic structure of the dolomite, and to monitor contaminant levels in the lower portion of the formation. D-wells were originally B-wells that were modified by drilling them an additional 12 meters (40 feet) on the average to observe water levels in the upper third of the Lockport Dolomite during pumping tests. T-wells were screened at various levels in the overburden to observe water levels during the slug tests.

178 Monitoring wells were installed during the investigation: 89 A-wells; 85 B-wells; and 4 C-wells. (Only A-, B-, and C-wells were sampled for chemical analysis.) A typical monitoring site consisted of an A-well and either a B-well or a C-well. Some sites, however, had only an A-well or only a B-well. Four T-wells were installed and three B-wells were modified as D-wells for testing purposes. Four wells (one A-well and three B-wells) had to be abandoned and reinstalled.

Well logs and as-built diagrams for all wells appear in Appendices G (T-wells) and H (A-, B-, C-, and D-wells). The general procedures used in installing the wells are described in the following five sub-sections. All wells were installed using soil-boring, hollow-auger type drill rigs (e.g. CME-45). Site-specific conditions sometimes required that these procedures be modified slightly. Any modifications in well construction are shown on the individual as-built diagrams. It was the responsibility of each supervisory geologist to react to site-specific conditions and ensure that wells were installed that would meet the objectives identified earlier in this section.

Shallow Bedrock Well Drilling Procedure (B-wells)--

1. Set up drill over the wooden stake placed on the site by the survey team, and rope off the working area if not within the fenced portion of the Canal. No drilling is to commence until a Work Authorization Form is issued and all personnel are wearing the safety equipment required in the health and safety plan.

2. Begin to auger into the overburden with a 15 centimeter (6 inch) diameter auger bit.

3. As the drilling progresses, take split-spoon samples of the overburden material each time it appears a change has taken place in the physical composition of the augered material in order to verify the change. Record descriptions of all overburden materials in the field notebook, and then discard the sample in a 55-gallon drum. (The split-spoon samplers used had a 5-centimeter (2-inch) outside diameter, a 3.5-centimeter (1-3/8-inch) inside diameter, and were capable of collecting a 61-centimeter (24-inch) sample upon full recovery. The split-spoons were driven into the undisturbed material to be sampled with a standard 63.5 kilogram (140 pound) drilling hammer.) Certain sites were selected for continuous split-spoon sampling. These samples were wrapped in plastic to preserve moisture and placed in standard NX coreboxes. Detailed descriptions of the samples were subsequently made at the JRB/SAI field office.

(These descriptions can be found in Appendix E.) All split-spoon samples were described using a standard Muncell color book and the USDA soil classification system. The continuous split-spoon samples were ultimately sent to EPA's R.S. Kerr Environmental Research Lab in Ada, Oklahoma for additional testing.

4. To verify the contact with bedrock, remove the auger plug, and attempt to obtain a split-spoon sample. If refusal occurs (i.e., if the split-spoon cannot be driven into the material) bedrock is fairly certain. Check any rock fragments brought up in the split-spoon to verify that they are dolomite, since large igneous and metamorphic boulders exist in the till.

5. Remove all auger flights and drive a 15-centimeter (6-inch) diameter casing firmly onto bedrock.

6. Using a 14.3-centimeter (5-5/8-inch) tri-cone bit, flush the casing with hydrant water until all material collected in the casing during the driving process is removed. If needed, use a sludge barrel welded above the tri-cone bit to clean the hole of gravel and cuttings. All wash material removed from the hole (typically between 10 and 100 gallons depending on the hole) must be captured in a trough and pumped into a tanker truck for safe disposal.

7. Using the tri-cone bit, drill 15 to 30 centimeters (0.5 to 1 foot) into bedrock to provide a socket for the well casing. If necessary, use a sludge barrel to clean gravel and cuttings from the borehole.

8. Set a 10-centimeter (4-inch) well casing inside the 15-centimeter (6-inch) outer casing and pound it into the bedrock socket.

9. Grout the well casing in the hole using a tremie pipe in the annulus. Allow the grout to back-fill momentarily into the bottom of the well casing to ensure a secure seal. Pull the outer casing while installing the grout.

10. Allow the grout to set a minimum of 12 hours.

11. Clean out the well casing with a 7.5-centimeter (2-15/16-inch) tri-cone bit and a sludge barrel.

12. Drill or core 1.5 meters (5 feet) into the bedrock. Make careful measurements of specific conductivity (at each 30-centimeter (1-foot) interval), water levels, and drilling water used to enable an accurate determination of the water-bearing zones. (While these data were quite useful in verifying that a water-bearing zone at a site had been tapped, they were inadequate to correlate these zones between sites.)

13. If water is encountered within the 1.5 meters (5 feet), complete the well as in step 15.

14. If no water is encountered after drilling 1.5 meters (5 feet), drill an additional 1.5 meters (5 feet).

15. Flush the hole, pull the drilling pipes, and purge (pump) the well until all coring water has been removed. (An as-built diagram of a typical B-well is shown in Figure 9. Purging data are summarized in Appendix C.)

16. Once the well is installed, take a final water level measurement prior to leaving the site.

17. Dispose of all cuttings and disposable safety equipment in 55-gallon drums with lids until the area is declared clean. Label all drums with the appropriate site number and transport them to the waste storage area.

18. Ensure that the site is clear of all equipment, debris, and drums before leaving.

19. Place a lock on the well cap and proceed to the decontamination area.

20. Report the completion of the well to the Field Operations Supervisor so that a concrete vault can be installed and the well can be surveyed.

21. Return to the site as time allows to verify that the vault has been installed properly and to take additional water level measurements.

Deep Bedrock Well Drilling Procedure (C-wells)--

1. Follow steps 1 through 11 of the shallow bedrock well drilling procedure.

2. Core with a 3-meter (10-foot) long, 7.6-centimeter (3-inch) diameter, NX core barrel through the Lockport Dolomite until contact with the Rochester Shale is verified. Make careful measurements of water levels and the amount of drilling water used to enable an accurate determination of the water-bearing zones.

3. As each 3-meter (10-foot) section of core is extracted from the core barrel, place it in a standard NX corebox, wash it with clean water, allow it to dry, and then label it. To label the core, first mark its length with two different colored stripes using two indelible markers which have been taped together. This will ensure that pieces of the core will not be turned around inadvertently during handling. Then label the section of the core and the inside cover of the corebox with the depths of the beginning and end of the coring run. Also, number the cover of each corebox as it is filled. (Typically, 12 to 14 coreboxes are needed to store the cores from a single C-well.)

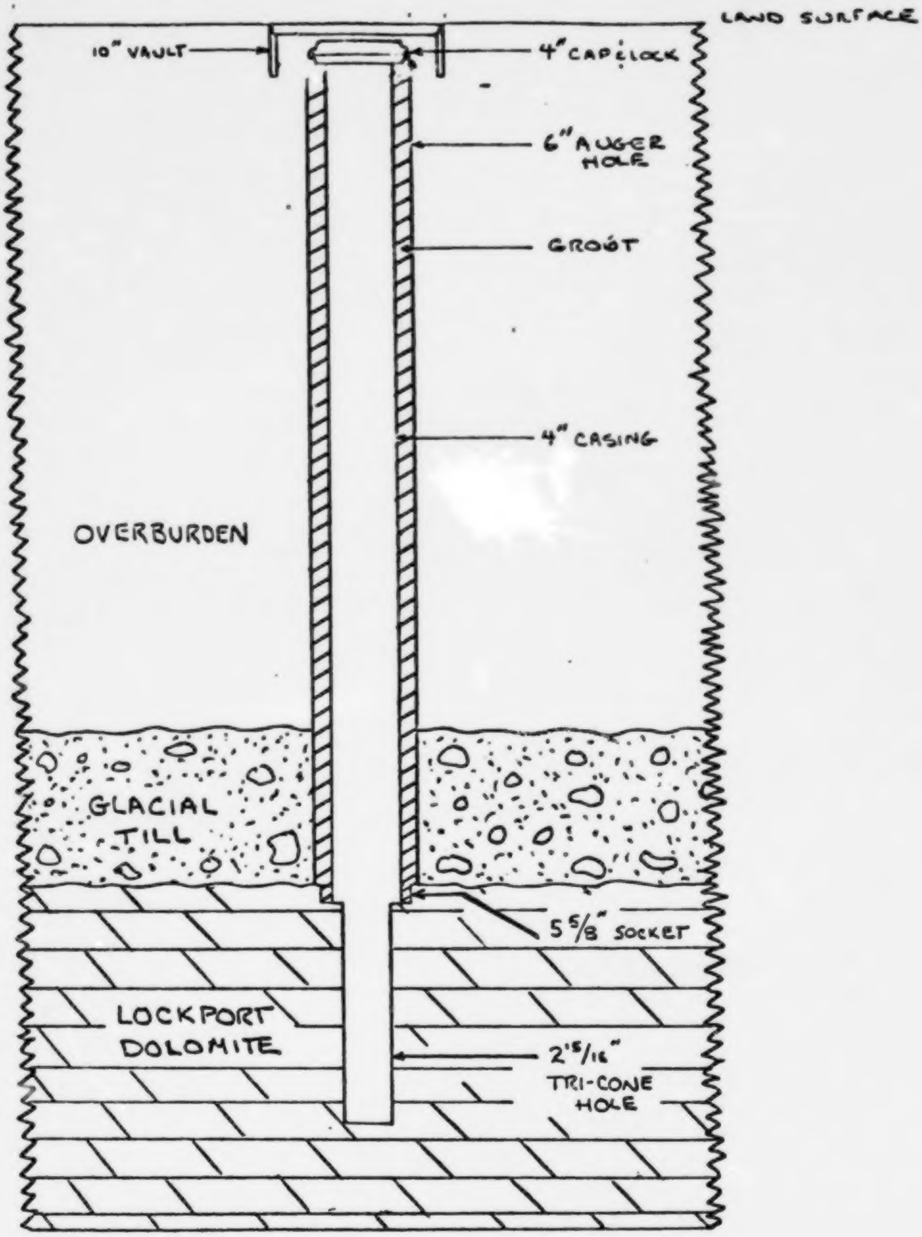


Figure 9. Diagram of a Finished Shallow Bedrock Well.

4. Once the Rochester Shale has been reached, remove the core bit and prepare to conduct the prescribed tests. (See the section on aquifer testing.)

5. Upon completion of the testing, backfill the hole with grout to the distance from the top of the well that is specified on the Work Authorization Form.

6. After the backfilling is completed, allow the well to stabilize for 12 hours and take a static water level reading.

7. Follow steps 17 through 21 of the shallow bedrock well drilling procedure.

Modified Medium-depth Well Drilling Procedure (D-wells)--

1. Set up to continue drilling in the B-well specified by the Work Authorization Form. No drilling is to commence until all personnel are wearing the safety equipment required in the health and safety plan.

2. Drill an additional 12 meters (40 feet) with a 7.5-centimeter (2-15/16-inch) tri-cone bit, following the procedures described in step 12 of the shallow bedrock well drilling procedure.

3. Follow steps 15 through 18 of the shallow bedrock well drilling procedure.

4. Replace the lock on the well cap and report the completion of the well to the Field Operations Supervisor.

Overburden Well Drilling Procedure (A-wells)--

1. Set up to drill within 3 meters (10 feet) of the B-well (or C-well). No drilling is to commence until a Work Authorization Form is issued and all personnel are wearing the safety equipment required in the health and safety plan.

2. Follow steps 2 and 3 of the shallow bedrock well drilling procedure.

3. Take a split-spoon sample at the depth where the well screen is to be placed. (Generally, A-wells are screened in the silty clay just above the till. Deviations from this generalization are based on cuttings from both the bedrock well and the overburden (A-) well.)

4. Auger an additional 0.6 meter (2 feet) to accommodate the well's sump. (The sump is a piece of well casing with a cap on the end which is welded onto the bottom of the screen so that fine-grained particles from the aquifer that pass through the screen will not clog the well.)

5. Withdraw all auger flights from the bore hole. Install the 5-centimeter (2-inch) diameter well with the screen into the hole. If

aquifer materials might collapse into the open hole, set the well through the hollow-stem auger.

6. Add 30 centimeters (12 inches) of bentonite pellets around the sump. Add sand around the well screen to within 1.5 meters (5 feet) of the top of the well. If the well is installed through the auger stem, gradually pull the auger flights out of the hole while adding sand alternately with the withdrawal of a section of the auger.

7. Add 30 centimeters (12 inches) of bentonite pellets around the well and then add grout to within 1 meter (3 feet) of the top of the well. (A diagram of a typical A-well is shown in Figure 10.)

8. Follow steps 16 through 21 of the shallow bedrock well drilling procedure.

Test Well Drilling Procedure (T-wells)--

1. Follow steps 1 through 3 of the shallow bedrock well drilling procedure.

2. Auger to the depth specified on the Work Authorization Form.

3. Follow step 5 of the overburden well drilling procedure. Do not attach a sump to the bottom of the well; attach a cap directly to the bottom of the screen.

4. Add sand outside the well to about 25 centimeters (10 inches) above the screen. Add about 15 centimeters (6 inches) of bentonite pellet above the sand. Add grout to about 20 centimeters (8 inches) from the top of the well.

5. Set a piece of 10-centimeter (4-inch) casing in the grout around the well so that it is about 10 centimeters (4 inches) above the top of the well.

6. Follow steps 16 through 19 of the shallow bedrock well drilling procedure and report the completion of the well to the Field Operations Supervisor.

AQUIFER TESTING

Two types of aquifer tests were conducted--pumping tests and slug tests. The purpose of conducting the pumping tests was to define quantitatively the hydrologic properties of the bedrock and to evaluate the degree of interconnection of the overburden and the bedrock aquifers. Pumping tests utilized A-, B-, C-, and D-wells. The purpose of the slug tests was to define quantitatively the hydrologic properties of different zones in the overburden. All slug tests were conducted on T-wells. The procedures for the two types of tests are described below.

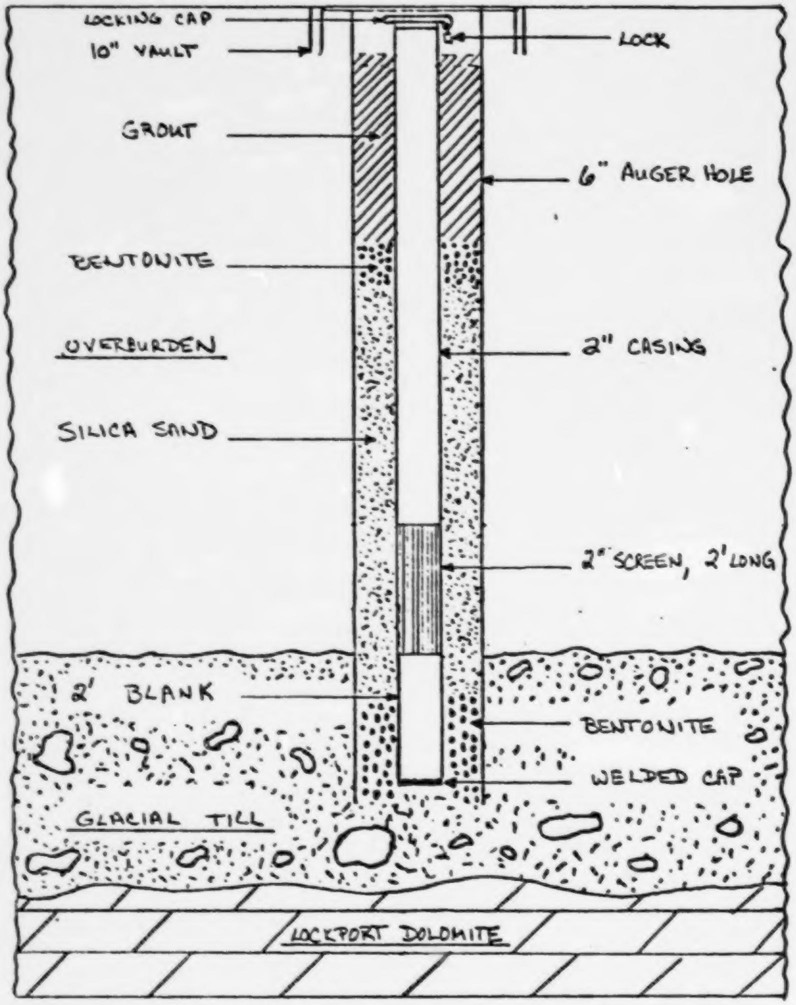


Figure 10. Diagram of a Finished Overburden Well.

Pumping Test

Three pumping tests were conducted during the study period, two 10-hour tests and one 22-hour test. One 10-hour test was conducted using well 56-C as the pumping well and wells 56-A, 72-A, and 72-C as observation wells. The other 10-hour test used well 72-C as both the pumping and the observation well. These tests utilized a 5-centimeter (2-inch) centrifugal pump discharging at about 38 liters (10 gallons) per minute in the first test, and 150 liters (40 gallons) per minute in the second test. The purpose of these tests was to provide general hydrologic data needed to plan the 22-hour test. The 22-hour test was conducted using well 72-C as the pumping well, and wells at sites 38, 39, 44, 48, 49, 50, 56, 67, 68, 71, 79, 80, 86, and 89 as observation wells. This test utilized a 10-centimeter (4-inch) submersible pump discharging between 257 to 121 liters (68 to 32 gallons) per minute. The purpose of this test was to define the hydrologic properties of the bedrock aquifer. The general procedure for conducting the pumping tests is described below:

1. Insert the pump's suction line into the pumping well.

2. Place the pump's discharge line into the Love Canal Treatment Plant's collection system.

3. Measure static water levels in all wells to be used in the test. Record the data on the pumping test data forms.

4. Start the pump and signal all test participants with an air-horn blast.

5. Regulate the discharge to a constant rate and measure the rate. Record the rate on the data forms. (During the 22-hour test, the discharge rate decreased unavoidably from 68 gallons per minute to 32 gallons per minute because of a decrease in head.)

6. Measure the drawdown (the increase in the depth to water due to pumping) in all wells as often as conditions permit for the first half hour of pumping. Record the drawdowns on the data forms.

7. Measure the drawdowns in all wells at least every half hour throughout the duration of the test. Record the drawdowns on the data forms.

8. Periodically measure the discharge and record all readings on the data forms.

9. At the end of the test, signal all participants with the air-horn. Record water level recoveries as conditions permit for the next hour. Record all recoveries on the data forms.

Slug Test

The slug tests were conducted on the four T-wells located on the east side of the basketball court, west of the Canal on 92nd Street. The wells were completed at different depths--T-1, 2.9 meters (9.5 feet); T-2, 5 meters (16.4 feet); T-3, 8 meters (26.4 feet); and T-4, 9.8 meters (32.3 feet)--

using a 5-centimeter (2-inch) PVC pipe with a 1.5-meter (5-foot), 20-slot PVC screen. A no. 4 quartz sand pack was used in the well from the bottom to about 30 centimeters (1 foot) above the top of the screen. The wells were grouted to within 18 centimeters (7 inches) of the land surface. A 0.9-meter (3-foot) section of 10-centimeter (4-inch) casing with a locked cap was used to secure the well.

The four wells were screened in very similar sediment types. In well T-1 the screened zone was clay, brown to gray brown, with gray sand layers, all slightly moist. Wells T-2 and T-3 were completed at different depths in the same material; clay, brown to gray, with moisture increasing with depth. The fourth well, T-4, was completed in the till which had a red silty clay matrix with subangular gravel. Figure 11 is the stratigraphic log for these test wells. The procedure for conducting the slug test is described below.

1. Measure the static water level in the four wells. (All measurements were made from the top of the 10-centimeter (4-inch) casing. Specifically, the measuring tape was suspended in the well and was read at the bottom of a straight edge which was placed across the casing.)

2. Begin the test at well T-4 (the deepest) first. Begin the tests on wells T-3, T-2, and T-1 in sequence, 5 minutes apart.

3. Fill the test well with water to the top of the casing as quickly as possible with a hose attached to a fire hydrant.

4. Start a stopwatch as each well is filled.

5. Take water level measurements using a tape and a water soluble marker. Enter these readings on the data sheet for each well. (The measuring times were 30 seconds, 1 minute, 2 minutes, 4 minutes, 8 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 8 hours, and 20 hours from the time the well was filled.)

Final Water Level Measurements

In an attempt to obtain water level readings that were not being influenced by any on-going activity in the area, and to allow the two-aquifer system to reach equilibrium, all wells were measured one week after drilling, testing, and sampling activities had ceased. All measurements were taken from the top of the well using a fiberglass measuring tape and a water soluble marker. The readings were accurate to about 1.3 centimeters (0.05 foot). The depth-to-water measurements were converted to elevations and then plotted and contoured on maps of the study area. The water table elevations appear in Appendix B, and the contour maps are contained in Section 4 of this report.

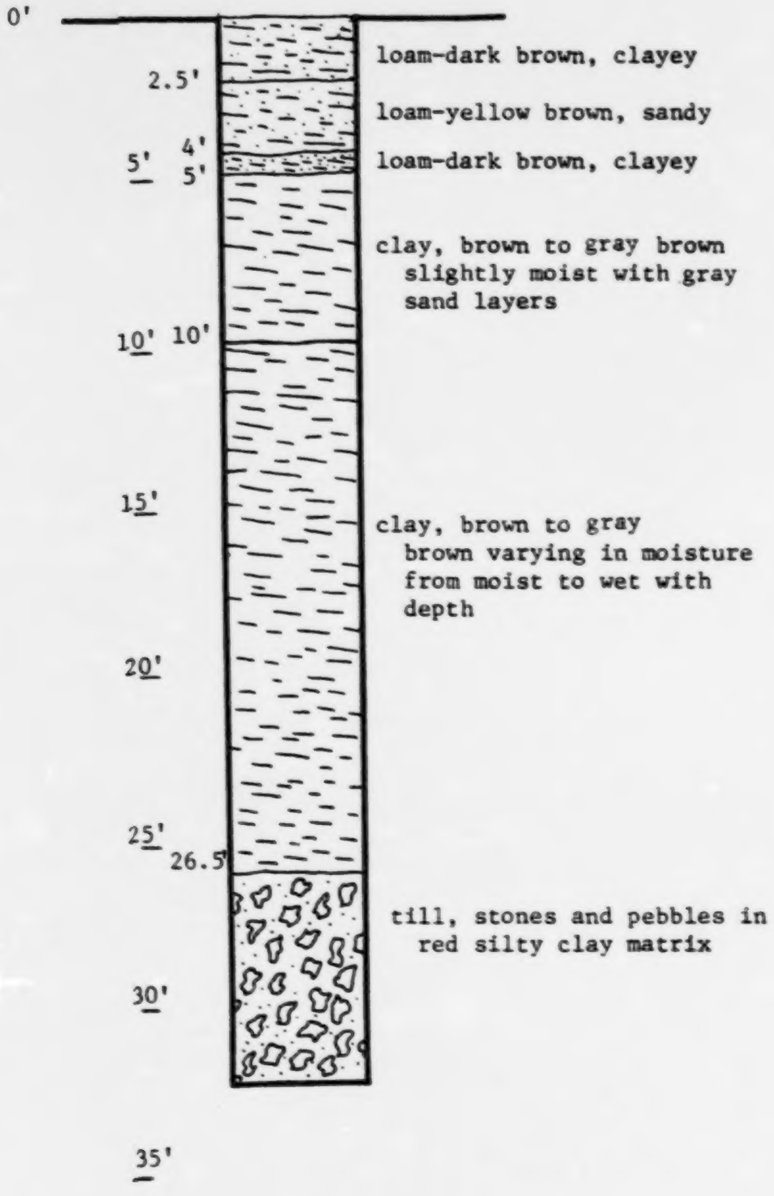

0'
2.5'
4'
5'
5'
10'
10'
15'
20'
25'
26.5'
30'
35'
loam-dark brown, clayey
loam-yellow brown, sandy
loam-dark brown, clayey
clay, brown to gray brown slightly moist with gray sand layers
clay, brown to gray brown varying in moisture from moist to wet with depth
till, stones and pebbles in red silty clay matrix

Figure 11. Well Log for Test Wells.

GROUND-WATER SAMPLING

While most of the field efforts on this project involved installing and testing the wells, implementing the ground-water sampling plan was the key element in the Love Canal monitoring program. The purpose of the sampling plan was to identify any chemicals in the ground-water of the study area, where in the area these chemicals are located, and what the concentrations of the chemicals are where they appear. From this information it is possible to deduce the general directions in which each chemical is migrating.

The goals of the ground-water sampling plan were to:

- Collect samples from the wells that are representative of the quality of the ground water of the study area
- Collect samples in a technically-sound manner so not to jeopardize the scientific integrity of the results
- Avoid inadvertantly contaminating otherwise "clean" samples with chemicals from other parts of the study area.
- Ensure that the health and safety of the sampling team was not endangered in collecting the ground-water samples.

To achieve these goals efficiently, specific field procedures were developed for purging the wells, collecting the samples, and ensuring quality control. These procedures are described in the following three sub-sections.

Purging

"Purging" a monitoring well involves withdrawing enough water from it so that no stagnant water or water that has been affected by the well installation process is sampled. Purging a well before sampling thus helps to ensure that the water sample ultimately collected is representative of the water in the aquifer. The amount of water that must be purged from a well before sampling depends on how much standing water is in the well and how the well was installed. Generally, purging three to five times the volume of standing water in a well is considered adequate. For this study, ten well volumes of water were purged instead of three to five volumes as an extra margin of safety. In addition, an even greater amount of water was purged from the B- and C-wells because water was added to the aquifer during the well installation process. (This is why the well drilling procedures for the B- and C- wells required the supervisory geologist to monitor the amount of water used during rock drilling.) Therefore, the quantity of water finally purged from bedrock wells was equal to the quantity of water added during drilling plus ten times the volume of standing water in the well. The amount of water purged from each well is given in Appendix C.

After the well is purged, it must also be allowed to recover from the process. This is mainly because the rapid movement of water caused by pumping affects the quality of the water entering the well. For example, some chemicals which are dissolved in well water can evaporate and be lost when the water is agitated during pumping. Consequently, all wells were allowed to recover after purging for a minimum of twelve hours so that the quality of the well water would reach a natural equilibrium before sampling.

The field procedures used for well purging are described below:

1. Clean all pipes to be inserted into the well by scrubbing them with an Alconox (soap) solution, and rinsing them with deionized water.
2. Measure the depth to water, and the depth of the well.
3. Calculate the volume of water to be purged based on the amount of standing water in the well, and the amount of water added during drilling.
4. Insert the cleaned, 2-centimeter (3/4-inch) steel pipes into the well to approximately the midpoint of the water column.
5. Attach the suction line of a centrifugal pump to the pipes.
6. Place the discharge line of the pump into a 55-gallon drum, tank truck, or other suitable container for later treatment at the Love Canal Treatment Plant.
7. Purge the well. (In purging a B-well, the intake line is placed roughly 25 feet below land surface near the midpoint of the water column in the well. The pump is then set at its maximum discharge rate, and allowed to run until the water level falls below the lift capacity of the pump. This procedure ensures that there will be no stagnant water left above the intake line. After the well recharges, the procedure is repeated until an adequate volume of water has been removed from the well. Turbulence in the well water during the pump/recharge cycle ensured that there is not stagnant water below the intake line. In purging an A-well, the intake line is lowered during pumping until the well is pumped dry.)
8. Disconnect the pump and remove the pipes from the well after a sufficient amount of water has been purged from the well.
9. Allow the well to recover for at least 12 hours before sampling.
10. Pump five gallons of clean water through the pumps at the end of each day to prevent transporting contaminated material between sites, and to reduce the wear and tear on the pumps.

Sampling

The chemical parameters tested for in the Love Canal Ground-water Monitoring Program were:

- Volatile organics
- Semivolatile organics
- Pesticides
- Metals
- 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
- Nitrates and fluorides
- Total Organic Carbon and Total Organic Halogens (TOC/TOX)

Volatile organics are organic chemicals (that is, chemicals that contain carbon atoms) that evaporate readily when exposed to air. Semivolatile organics are organic chemicals that evaporate much more slowly than volatile organics when exposed to air. The volatile organics, semivolatile organics, pesticides, and metals tested for in the program together with the chemical 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) include 129 different chemicals which EPA has designated as "priority pollutants" because of their especially harmful health effects. Examples of these chemicals which are volatile organics, semivolatile organics, pesticides, or metals are listed in Table 5.

Also tested for in the program were nitrates, fluorides, and two general indicators of contamination by organic chemicals, total organic carbon (TOC) and total organic halogens (TOX). "Total organic carbon" is the concentration of all the carbon from organic chemicals that are in the sample. "Total organic halogens" is the concentration of all the halogens (that is, fluorine, chlorine, bromine and iodine) from organic chemicals that are in the sample.

Samples used to test for the seven chemical parameters were collected from all A-, B-, and C-wells, with one exception--TCDD. Testing for TCDD is a very complicated, time-consuming, and expensive procedure. Furthermore, the very low solubility in water of this compound dictates that more emphasis be placed on soil and sediment testing where TCDD is more likely to be concentrated. Consequently, only three wells were tested for TCDD: wells 73-A, 77-B, and 104-A.

There are a variety of methods available for collecting well water for sample analysis. However, not all of these methods are appropriate for the parameters under consideration. For example, pumping the well to obtain samples can create excessive turbulence which will cause volatile organics to evaporate, thus reducing their concentrations in the sample to be tested. (The method used to purge the well was not important since the wells were allowed to recover after purging.) The one method that is appropriate for all the chemical parameters is to bail the well.

Table 5. Examples of volatile organics, semivolatile organics, pesticides and metals tested for in Love Canal Ground-Water Monitoring Program

Volatile Organics	
Benzene	Methylene chloride
Carbon tetrachloride	Toluene
Chloroform	Xylene
Semivolatile Organics	
Benzidine	Phenol
Dichlorobenzene	Pyrene
Naphthalene	Tetrachlorotoluene
Pesticides	
Aldrin	DDT
Benzene Hexachloride (BHC)	Endrin
Chlordane	Polychlorinated biphenyl (PCB)
Metals	
Arsenic	Lead
Cadmium	Mercury
Chromium	Selenium

The bailer used for the ground-water sampling was a 75-centimeter (30-inch) long, 4.5-centimeter (1-3/4-inch) diameter, teflon tube having a small hole in the bottom (see Figure 12). Water enters through this hole, as the bailer is lowered into the well. When the bailer is full, a 2.5-centimeter (1-inch) diameter, glass marble covers the hole, thus holding the water in the bailer. In this way, sample turbulence is minimized.

Each of the seven parameters requires a different sample container and sample preservation technique. All sample containers were cleaned and prepared by GCA and provided to JRB/SAI. The proper container preparation techniques are detailed in Appendix A of GCA's Quality Assurance Plan. The type of container used for each of the seven parameters is listed in Table 6. Proper sample preservation techniques are important so that there are no changes in the concentrations, physical states, or chemical forms of the chemicals in the sample, before it is tested. Sample preservation generally involves refrigeration and pH adjustment. In this study, all samples were refrigerated to 4°C (39°F). Additional preservation techniques required for the seven chemical parameters are listed in Table 6.

After a given well was purged and had recovered, sample collection began. All sampling team members were required to wear the same safety equipment as the supervisory geologists, as specified in the health and safety plan. Sampling followed these general steps:

1. Wash the teflon bailer by scrubbing it with an Alconox solution and rinsing it with deionized water.

2. Lower the bailer into the well with a stainless steel cable to approximately the midpoint of the water column.

3. When full, carefully raise the bailer from the well.

4. Pour water in the bailer into the sample container to the neck of the bottle.

5. Add the proper preservative to the sample container. (Specific sampling and preservation procedures are outlined in Table 6.)

6. Cap the sample container and label it according to chain-of-custody procedures.

7. Fill out the chain-of-custody forms (as described in the next section).

8. Repeat this process for each of the seven chemical parameters (TCDD was taken only at wells 73-A, 77-B, and 104-A).

9. Put the samples in thermal chests, pack them with ice, and transport them to the Sample Bank within four hours of collection.

Special sampling procedures used together with the general procedures described above are listed in Table 6.

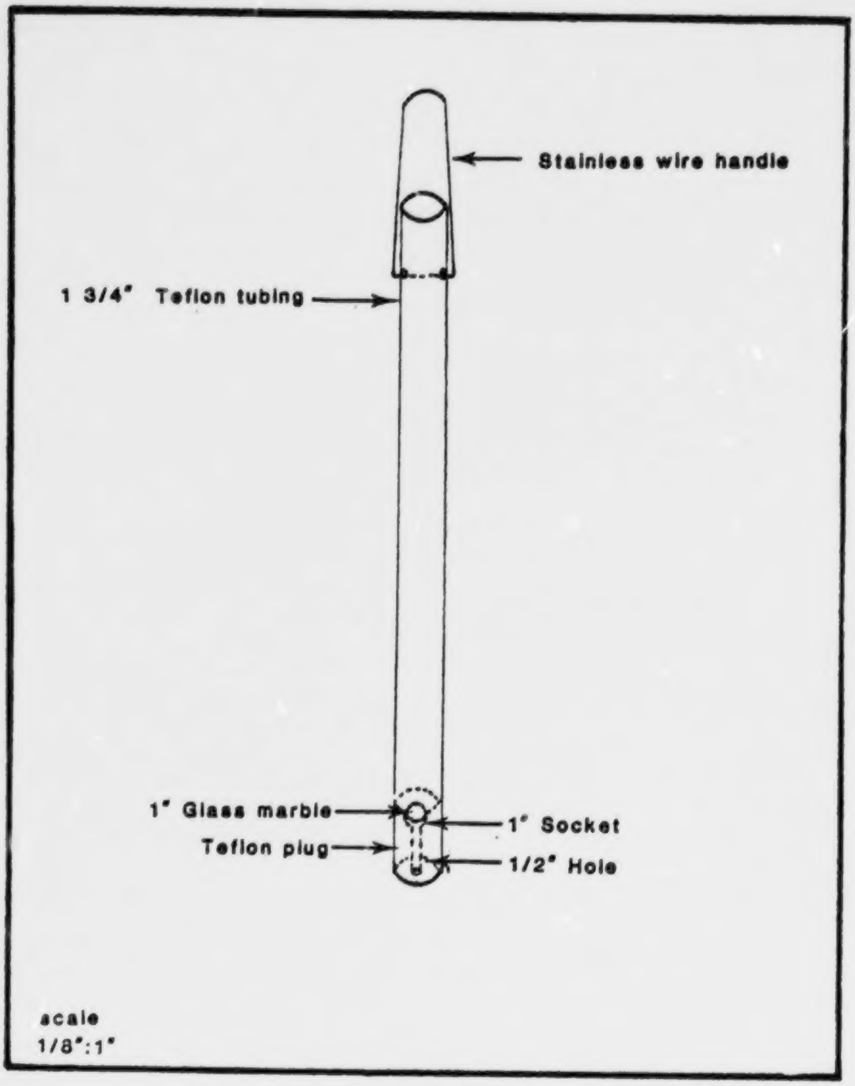


Figure 12. Diagram of the Teflon Bailer Used for Sampling Ground Water

TABLE 6. TYPE OF SAMPLE CONTAINER AND SPECIAL SAMPLE COLLECTION AND PRESERVATION PROCEDURES FOR THE SEVEN PARAMETERS TESTED IN THE LOVE CANAL GROUND-WATER MONITORING PROGRAM

PARAMETER	SAMPLE CONTAINER	SPECIAL SAMPLE COLLECTION PROCEDURE	SAMPLE PRESERVATION PROCEDURE
VOLATILE ORGANICS	TWO, 40 MILLILITER VIALS WITH TEFLON-FACED SILICONE SEPTA AND TEFLON-LINED SCREW CAPS	TURBULENCE IN THE SAMPLE MUST BE AVOIDED OR THE VOLATILE ORGANICS WILL NOT REMAIN IN SOLUTION. THEREFORE, BE SURE TO: • RAISE THE FILLED BAILER OUT OF THE WELL SLOWLY SO THAT A MINIMUM AMOUNT OF DISTURBANCE WILL RESULT AS THE SAMPLE IS RETRIEVED. • POUR THE SAMPLE WATER IN THE BAILER CAREFULLY INTO A TILTED 40 MILLILITER VIAL SO THE WATER RUNS GENTLY DOWN THE SIDE OF THE VIAL WITH MINIMAL TURBULANCE. • CONTINUE POURING THE SAMPLE WATER FROM THE BAILER INTO THE VIAL UNTIL IT IS FILLED AND OVERFLOWS FOR A FEW SECONDS. • SET THE TEFLON-COATED SILICONE SEPTA CAREFULLY INTO PLACE AND FIRMLY SCREW ON THE TEFLON-LINED CAP. • INVERT THE VIAL TO CHECK FOR AIR BUBBLES. IF ANY ARE PRESENT, SELECT ANOTHER VIAL AND RESAMPLE. DISCARD THE VAIL WITH THE ENTRAPPED AIR.	NONE
SEMIVOLATILE ORGANICS	ONE, ONE-GALLON AMBER GLASS BOTTLE WITH A TEFLON-LINED SCREW CAP	USE A ONE QUART CONTAINER IF THE SAMPLE IS TO BE DESIGNATED "POISON B".	NONE
PESTICIDES	SAME AS FOR SEMI-VOLATILE ORGANICS	SAME AS FOR SEMIVOLATILE ORGANICS	ADD A MEASURED VOLUME OF NaOH OR H_2SO_4, AS NEEDED, TO BRING THE pH OF THE SAMPLE IN THE RANGE OF 5 TO 9. CAP THE BOTTLE AND MIX THOROUGHLY.
TCDD	SAME AS FOR SEMI-VOLATILE ORGANICS	SAME AS FOR SEMIVOLATILE ORGANICS	ADD A MEASURED VOLUME OF NaOH or H_2SO_4, AS NEEDED, TO BRING THE pH OF THE SAMPLE IN THE RANGE OF 6 TO 8. CAP THE BOTTLE AND MIX THOROUGHLY.
METALS	ONE, 500 MILLILITER CLEAR GLASS JAR WITH A TEFLON-LINED SCREW CAP.	NONE	ADD A MEASURED VOLUME OF 1:1 ULTREX HNO_3, AS NEEDED, TO BRING THE pH OF THE SAMPLE UNDER 2. CAP THE JAR AND MIX THOROUGHLY.
NITRATE AND FLUORIDE	ONE, 500 MILLILITER PLASTIC BOTTLE WITH A TEFLON-LINED SCREW CAP.	NONE	ADD ONE MILLILITER OF CONCENTRATED H_2SO_4. CAP THE BOTTLE AND MIX THOROUGHLY.
TOTAL ORGANIC CARBON AND TOTAL ORGANIC HALOGENS (TOC/TOX)	SAME AS FOR METALS	TURBULANCE IN THE SAMPLE MUST BE AVOIDED OR THE VOLATILE ORGANICS WILL NOT REMAIN IN SOLUTION. THEREFORE, FOLLOW PROCEDURES SIMILAR TO THOSE GIVEN FOR VOLATILE ORGANICS.	NONE

Quality Control

To ensure that the sampling procedures and equipment did not cause any sample contamination, JRB/SAI collected three types of quality control samples: field blanks, rinse blanks, and triplicate QA/QC samples. Field blanks were prepared daily by GCA at the Love Canal Sample Bank by filling a complete set of sample containers with deionized water. The containers were picked up at the Sample Bank by JRB/SAI in the morning, carried in the sampling van during well sampling activities, and returned to the Sample Bank at the end of the day. Rinse blanks were prepared daily by JRB/SAI by filling a bailer, which had been cleaned according to the standard cleaning procedures described in the last section, with deionized water and filling a complete set of sample containers. Special preservatives (listed in Table 6) were used on the rinse blanks, but not on the field blanks.

The QA/QC samples were taken at eight wells (about five percent of the total number of wells) which were selected at random by GCA. The wells where QA/QC samples were taken are: 4-B; 31-B; 39-B; 52-B; 54-B; 65-B; 67-B; and 100-B. At these sites, three samples for each of the parameters being tested for were collected (with the exception of the nitrates/fluoride sample, for which four containers were collected).

SAMPLE DOCUMENTATION

Sample documentation refers not only to identifying a sample's origin, but also its "chain-of-custody." (Chain-of-custody refers to the transferral of a sample from one authorized individual or "custodian" to another. For example, JRB/SAI would transfer a ground-water sample to GCA who would, in turn, transfer it to an analytical laboratory. The documentation of these two transfers is that sample's chain-of-custody record.) The purpose of the chain-of-custody procedure was to establish the origin of the sample and its handling, from the time the water was bailed from a well, until it was ultimately tested, to verify that it was the same sample that was collected originally. The procedure also documented any tampering which may have occurred--either to the sample itself, the sampling equipment used, or the well sampled. This was done by using evidence tape, well locks, and custody seals, and documented log book entries noting their condition on each transfer. Analytical results for samples which do not have adequate chain-of-custody documentation or which may have been tampered with cannot be used for making interpretations regarding ground-water contamination or be admitted as evidence in court.

The procedures described below were developed for this project by GCA and EPA's National Enforcement Investigation Center (NEIC) in Denver, Colorado. These procedures follow guidelines discussed in:

- NEIC Policies and Procedures Manual, EPA-330/9-78-001R (Section II)
- Enforcement Considerations for Evaluation of Uncontrolled Hazardous Waste Disposal Sites by Contractors, NEIC, April 1980 (Sections VIII and IX).

The JRB/SAI sampling team implemented the procedures under the direction of quality control officers from JRB/SAI, GCA, and EPA.

Sample Identification

Sample containers were identified by means of sample collection tags (shown in Figure 13). The tags were a different color for each environmental media (e.g., soils and water) and were serially numbered starting with different blocks of numbers for each media. Each sample collected, including QA/QC samples, rinse blanks, and field blanks, had a completed sample tag securely attached to it. This was done by placing the container in a zip-lock plastic bag which was, in turn, placed in another zip-lock plastic bag holding the sample tag. In this way, the tag would not be defaced if the container were to break. QA/QC samples, rinse blanks, and field blanks were identified in the "Remarks" section of the tag.

After a sample had been transferred to the Love Canal Sample Bank, it was renumbered and identified with a sample analysis tag (shown in Figure 14) for shipment to an analytical laboratory. This renumbering step enabled quality control samples to be submitted to the analytical laboratory without the lab knowing their origin, as a further quality control check. The sample analysis tag was a different color and was numbered with a different block of numbers than the sample collection tags.

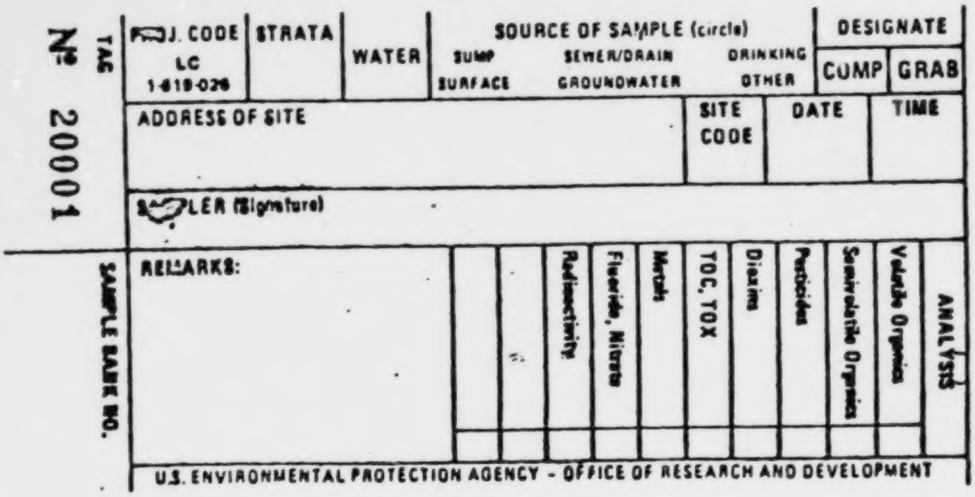
Sample Transfer

The chain-of-custody during each sample transfer was documented with chain-of-custody record forms and custody seals. Special chain-of-custody record sheets were developed for this program by GCA and NEIC, and are shown in Figures 15 and 16. The form shown in Figure 15 was used for samples collected by JRB/SAI and then transferred to the Love Canal Sample Bank. The form shown in Figure 16 was used for shipping samples from the Sample Bank to the analytical laboratories. Both forms were serially numbered, two-part carbonless-copy forms which contained the same information as the sample identification tags.

A chain-of-custody record sheet was prepared for each set of samples from a well. Their purpose was to document the transfer between parties of a group of samples being shipped together. When the grouping of samples changed, a new custody record was prepared. The original of the custody record always traveled with the samples; the initiator of the record kept the copy. When custody of the same group of samples changed hands several times, the original custody record showed that each person who had received custody had properly relinquished it.

In using the custody record sheet:

- The originator filled in all information from the sample tags.
- The person receiving custody checked the sample tag information against the custody record. He also checked the sample's condition and noted anything unusual under the "Remarks" section on the custody form.



TAG № 20001

PROJ. CODE LC 1-619-026	STRATA	WATER	SOURCE OF SAMPLE (circle) SUMP SEWER/DRAIN DRINKING SURFACE GROUNDWATER OTHER	DESIGNATE COMP	GRAB
ADDRESS OF SITE			SITE CODE	DATE	TIME
SAMPLER (Signature)					

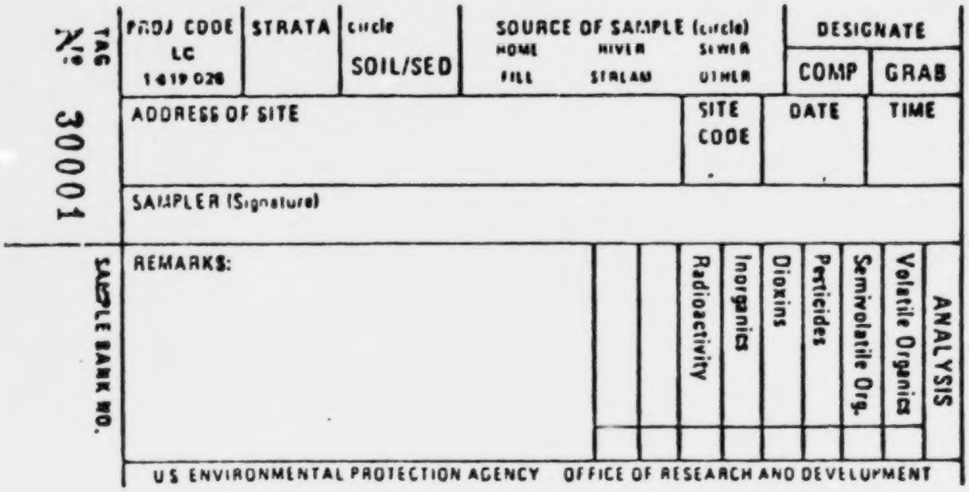
SAMPLE BANK NO.

REMARKS:

ANALYSIS: Radioactivity | Fluoride, Nitrate | Metals | TOC, TOX | Dioxins | Pesticides | Semivolatile Organics | Volatile Organics

U.S. ENVIRONMENTAL PROTECTION AGENCY – OFFICE OF RESEARCH AND DEVELOPMENT

WATER SAMPLE TAG



TAG № 30001

PROJ CODE LC 1 619 026	STRATA	circle SOIL/SED	SOURCE OF SAMPLE (circle) HOME RIVER SEWER FILL STREAM OTHER	DESIGNATE COMP	GRAB
ADDRESS OF SITE			SITE CODE	DATE	TIME
SAMPLER (Signature)					

SAMPLE BANK NO.

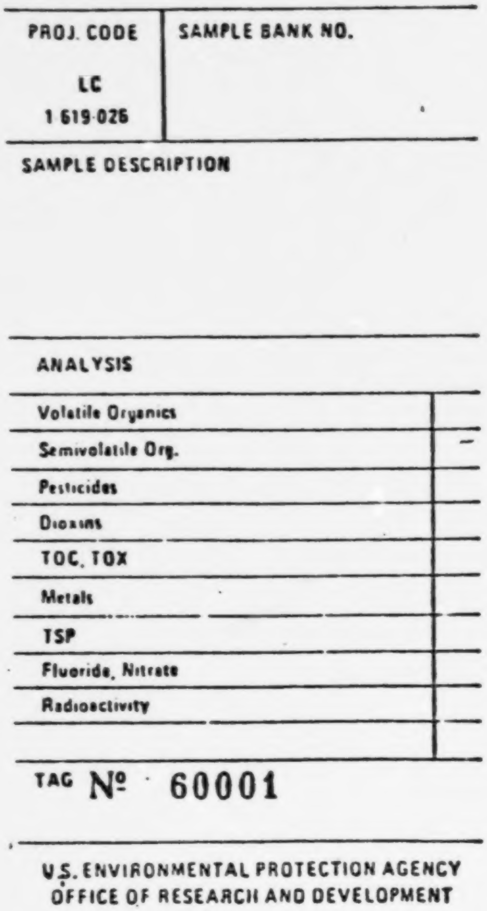
REMARKS:

ANALYSIS: Radioactivity | Inorganics | Dioxins | Pesticides | Semivolatile Org. | Volatile Organics

US ENVIRONMENTAL PROTECTION AGENCY OFFICE OF RESEARCH AND DEVELOPMENT

SOIL/SEDIMENT SAMPLE TAG

Figure 13. Sample Collection Tags for Water and Soils.



PROJ. CODE	SAMPLE BANK NO.
LC 1 619-026	

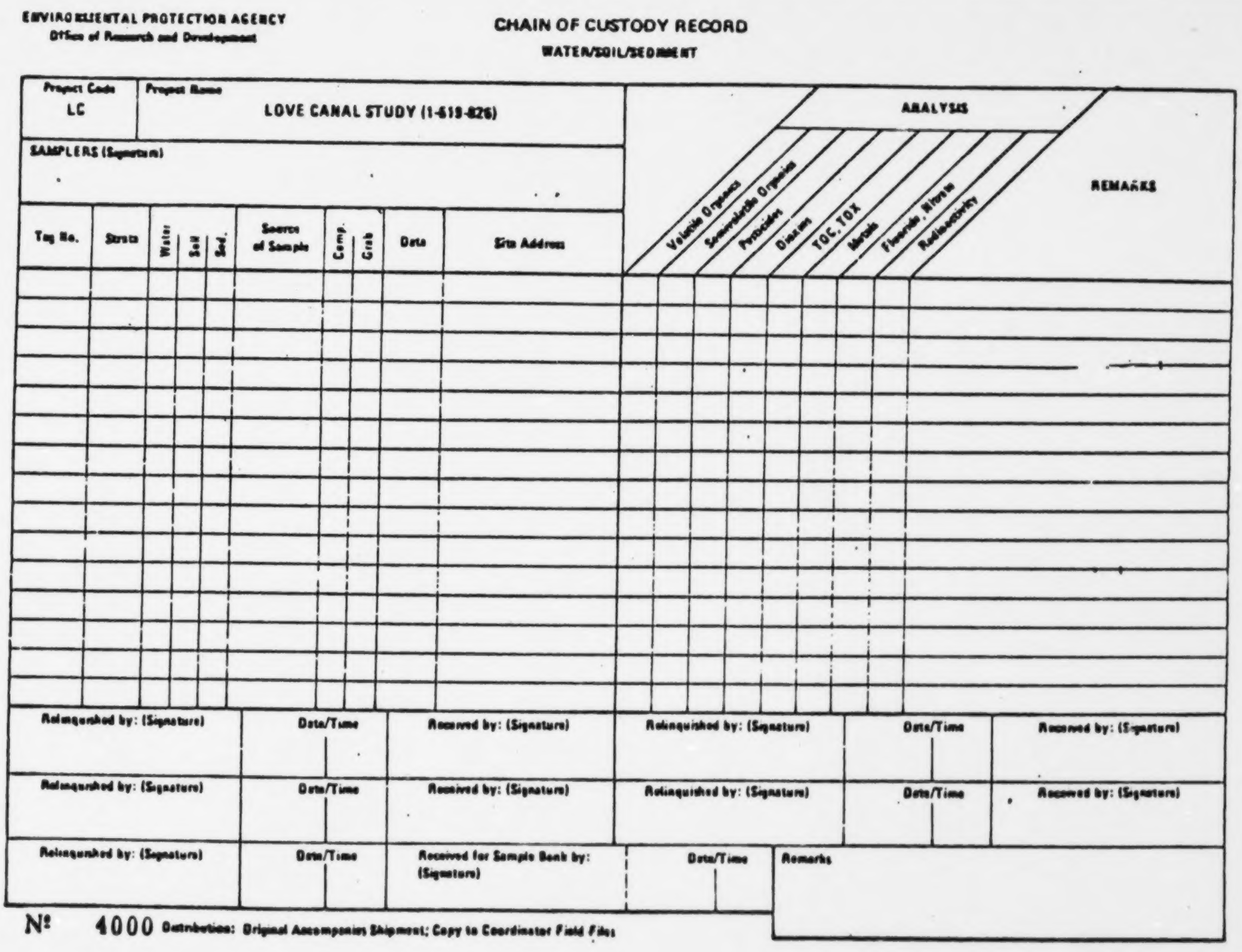
SAMPLE DESCRIPTION

ANALYSIS	
Volatile Organics	
Semivolatile Org.	
Pesticides	
Dioxins	
TOC, TOX	
Metals	
TSP	
Fluoride, Nitrate	
Radioactivity	

TAG № 60001

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

Figure 14. Sample Analysis Tag.



ENVIRONMENTAL PROTECTION AGENCY
Office of Research and Development

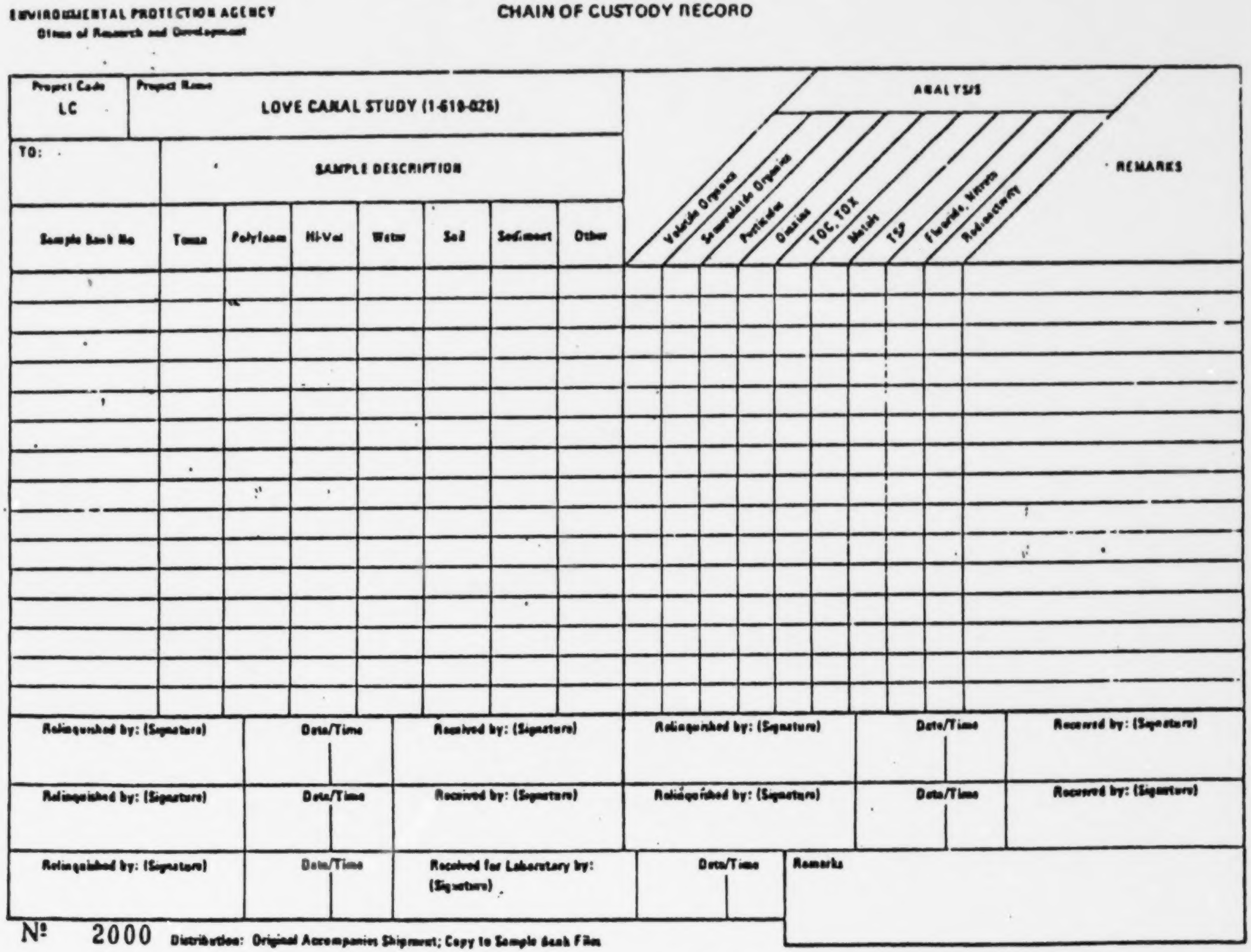
CHAIN OF CUSTODY RECORD
WATER/SOIL/SEDIMENT

Project Code LC	Project Name LOVE CANAL STUDY (1-619-826)									ANALYSIS								REMARKS
SAMPLERS (Signature)																		
Tag No.	Strata	Water	Soil	Sed.	Source of Sample	Comp.	Grab	Date	Site Address	Volatile Organics	Semivolatile Organics	Pesticides	Dioxins	TOC, TOX	Metals	Fluoride, Nitrate	Radioactivity	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Sample Bank by: (Signature)	Date/Time	Remarks	

Nº 4000 Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Figure 15. Chain-of-Custody Form for Transfering Samples from JPB/SAI to the Love Canal Sample Bank.



ENVIRONMENTAL PROTECTION AGENCY
Office of Research and Development

CHAIN OF CUSTODY RECORD

Project Code: LC

Project Name: LOVE CANAL STUDY (1-618-026)

TO:

	SAMPLE DESCRIPTION							ANALYSIS									REMARKS
Sample Bank No	Tissue	Polyfoam	Hi-Vol	Water	Soil	Sediment	Other	Volatile Organics	Semivolatile Organics	Pesticides	Dioxins	TOC, TOX	Metals	TSP	Fluoride, Nitrate	Radioactivity	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

№ 2000 Distribution: Original Accompanies Shipment; Copy to Sample Bank Files

Figure 16. Chain-of-Custody Form for Transferring Samples from the Sample Bank to an Analytical Lab.

- The originator signed in the top left "Relinquished by" box (located on the bottom of the form) and kept the copy.
- The person receiving custody signed in the adjacent "Received by" box and kept the original.
- The final person receiving custody crossed out all unused signature spaces and signed in the last "Received by" box.
- In all cases, it was readily apparent that the same person that received custody had relinquished it to the next custodian.

When a set of samples with its custody form was shipped, the shipper (e.g. Federal Express) signed the custody record before the package was closed so that he could verify the number and identification of the samples, if needed. The package was then closed and locked with a padlock or sealed with strapping tape and custody seals.

Custody seals were narrow strips of adhesive paper used to demonstrate that no tampering had occurred. They were used primarily on sample transport containers which were not secured by a padlock (such as core boxes). They were not used on individual sample containers.

The procedure followed for using custody seals on shipping boxes was:

1. Place the paper side of the seal against the box and wrap strapping tape across the middle of the seal and at least twice around the box.
2. Cut the tape so that the ends overlap at the seal.
3. Fold the seal onto itself and sign it.
4. Repeat this procedure for as many times as necessary to seal the box for shipment.

The person receiving custody of shipped samples was required to document the condition of the locked, or strapped and sealed shipping box on its arrival, and to check that neither the tape nor the custody seals had been cut or otherwise tampered with. If the paper seal had been damaged in shipping, but the shipping box had clearly not been opened, further handling of the samples proceeded. If tampering was suspected, the samples were not used further.

HEALTH AND SAFETY PLAN

JRB/SAI prepared a health and safety plan specifically for this study to protect the health of all personnel involved in installing and sampling the monitoring wells at the Canal. This plan has three elements -- health monitoring, safety procedures, and emergency procedures -- which are discussed in detail below.

Health Monitoring

Preliminary and follow-up examinations were required for all personnel involved in field work. The purpose of these exams was to identify as early as possible any adverse effects suffered by workers due to their work at the Canal. These examinations included:

- Personal and family medical histories, with specific reference to smoking, use of steroids, cancer history and previous work involving possible exposure to toxic chemicals including waste site investigations and sampling activities.
- Standard physical including blood pressure, heart rate, height and weight, vision, routine urine analysis and normalcy of internal organs.
- Pulmonary function testing to measure forced vital capacity and forced expiratory volume in one second, and a posterior-anterior chest x-ray to detect abnormal lung conditions.
- Resting electrocardiogram to identify heartbeat irregularities.
- Complete blood count, and SMAC-23 profile (which includes measurements of calcium, phosphorous, glucose, uric acid, alkaline phosphatase, total protein, total bilirubin, sodium, potassium, chloride, CO_2, triglycerides, and cholesterol) to detect blood abnormalities.

The preliminary exam was required before conducting any field activities. The follow-up exam was required within six months after field activities had been concluded. All medical records were reviewed by M. Chillingsworth of GCA. No adverse health effects due to exposure to hazardous chemicals were detected in any study participant.

Safety Procedures

Training--

All JRB/SAI personnel were briefed on the health and safety plan prior to entering the field. This briefing covered the use of safety equipment including respirators and SCBA, site safety procedures, first aid and emergency response procedures, and the role of the supervisory geologist, sampling team, and the on-site Health and Safety Officer.

Required Safety Equipment--

The following equipment and protective gear were worn by the supervisory geologists, drillers, and sampling team members at all ground-water monitoring sites:

- Steel-toed, chemically resistant boots
- Safety helmet
- Neoprene gloves
- Disposable coveralls
- Safety goggles or glasses

Cartridge respirators were not required to be worn, but were readily accessible to each person. Only NIOSH-approved respirators with TC-23 cartridges (for organic vapors) were used. The cartridges were discarded whenever contaminants were sensed within the respirator by the wearer, or after 20 hours of actual use. All personnel were trained and qualitatively fit-tested with their respirator prior to working in the field. Beards were not permitted if they broke the face seal. Users were responsible for routinely inspecting their respirators for cleanliness, and worn or defective parts. They were also required to clean respirators after use in areas where hazardous material was known or suspected of being released during drilling or sampling activities and before the final return of their equipment. Supervisory geologists and the onsite JRB/SAI Health and Safety Officer ensured that respirators were properly used and maintained.

Each supervisory geologist and sampling team member also had a water cooler and decontamination supplies with them at all times. In addition, two self-contained breathing apparatus (SCBA) units were located in the JRB/SAI field office, and an eye wash kit, first aid kit, and one SCBA were carried by the JRB/SAI on-site Health and Safety Officer.

Site Rules and Procedures--

All personnel working in the field were required to follow several specific rules. These rules helped to ensure that the work involved would be completed without endangering any worker or bystander. During the investigation:

- Designated safety equipment was worn at all times within the working areas.
- Proper decontamination procedures were followed before leaving the site area.
- A "safe" area was designated at each site where drinking water and washing facilities were available.
- No person was admitted within the roped-off area of a drilling site without the proper safety equipment.
- No eating, drinking, chewing gum, smoking, or open flames were permitted in the immediate vicinity of the drill sites.

- Gloves were removed and hands washed before eating, drinking, or smoking in the safe area.

- Additional safety equipment, including respirators and goggles, were put on at the first sign or suspected sign of free hazardous material (e.g., odor detected, or sound of gas release).

- Wearing contact lenses was avoided as much as possible.

- No cores, overburden or water samples, or contaminated equipment were handled without neoprene gloves.

- No gas cylinders were moved unless the regulators had been removed.

Decontamination

Because of the potential for contact with harmful substances, frequent routine decontamination of personnel and equipment was essential. The purpose of the decontamination procedures was to ensure that the health of study participants would not be jeopardized and to prevent spreading contaminated materials between monitoring sites in the study area.

Personnel decontamination procedures were followed at the end of every working day, and whenever else a study participant left a working area. Personnel decontamination included:

- Cleaning thoroughly all reusable safety gear (e.g., boots, gloves, and hardhats) with soap and water.

- Disposing of coveralls and any defective reusable safety gear (e.g., leaking boots or worn out gloves) in 55-gallon drums.

- Washing hands, face, neck and any other exposed area with soap and water or disposable wipes.

Study participants were also instructed to shower immediately after work before eating.

Equipment decontamination was carried out primarily in a small area at the southern end of the Canal which was constructed specifically for this activity. Solids generated during the process were placed in 55-gallon drums and taken to the CECOS disposal facility near Niagara Falls. Liquids were routed to the Love Canal Treatment Plant.

Prior to moving equipment to the cleanup area, most of the earth materials suspected of being contaminated were removed at each drill site. These materials were placed in 55-gallon drums for later disposal. This process minimized the amount of material that could fall off equipment during transport to the cleanup area.

Decontamination was conducted at the designated cleanup area using a high pressure water spray and brushes. Personnel were required to wear rubber boots, gloves, protective coveralls, hard hats, and as necessary, goggles and respirators. All contaminated or potentially contaminated items were transported to the designated cleanup area for decontamination at the end of each working day and prior to moving between sites. The following decontamination procedures were implemented by the drillers (Empire Soils Investigations) and supervised by JRB/SAI.

Upon arrival at the cleanup area, equipment was placed on the decontamination pad so that waste water from the process would have clear access to the central drain. Readily removable wastes were scraped off with brushes and gathered together in a dry side area with a shovel. Each item was then sprayed with the high-pressure water stream and scrubbed with brushes, as necessary. Particular attention was given to items having recessed areas or hollow centers such as tools, pipes and auger flights. Decontaminated items were then moved to a clean drainage area for drying. For persistent or greasy deposits on equipment, solvents such as acetone and hexane were used. Respirators were required to be worn while using solvents. Items cleaned with solvents were then thoroughly rinsed with water so not to contaminate the next drilling site with traces of these solvents.

All decontaminated equipment was inspected for cleanliness before being approved for reuse. The transport vehicle was also decontaminated before loading the cleaned equipment on it. After cleaning the vehicle and all equipment, the pad was also washed down. Solids were placed in labeled drums and moved to a storage area for later pick up. Personnel involved in the process then decontaminated themselves as described previously.

Emergency Procedures

Besides the potential for exposure to hazardous substances, accidents during the drilling process are also possible. Consequently, it was doubly important that all study participants were aware of procedures to be followed during such emergencies. The response to an emergency situation is two-fold: first obtaining immediate assistance and second, treating the problem.

All supervisory geologists and sampling teams were provided with a list of emergency telephone numbers, including local fire department, hospitals, and police. Field personnel also had access to a beeper system, and at least one vehicle, and were visited frequently by JRB/SAI's Health and Safety Officer.

In case of a work-related accident, assistance was to be requested immediately, and then appropriate first aid was to be applied by personnel at the site until medical assistance arrived. Each drill rig was equipped with a first aid kit, eye wash, and other such items. In the event of exposure to hazardous materials, assistance was to be requested, the victim was to be moved away from the contaminated area, and then treatment was to begin. Standard first aid procedures were reviewed with each supervisory geologist before beginning work on the project.

During field activities, only three minor incidents occurred, all of which involved dropped equipment and not exposure to harmful substances. All incidents were immediately reported to the JRB/SAI Health and Safety Officer who arranged for treatment. An incident report, which included recommendations for avoiding further incidents, was then submitted to GCA by the Health and Safety Officer in conjunction with the supervisory geologist. Figure 17 illustrates the form used for incident reporting.

Implementation and Documentation

To ensure that the health and safety plan was implemented as it was designed, an incident reporting system was also devised. This system provided a clear and efficient scheme for communicating problems. The supervisory geologist had the major responsibility for the health and safety of all personnel at the drilling sites. The Health and Safety Officer was responsible for ensuring that all field personnel understood and adhered to the health and safety plan.

Role of Supervisory Geologists--

The supervisory geologists at the drilling sites had the following responsibilities related to worker health and safety:

- Implementing the health and safety plan
- Maintaining personal safety equipment
- Ensuring that the health and safety of all personnel at the site was not jeopardized by improper equipment or unsafe practices
- Obtaining (and providing, as needed) emergency assistance
- Reporting all incidents to the JRB/SAI Health and Safety Officer, and completing incident reports when necessary.

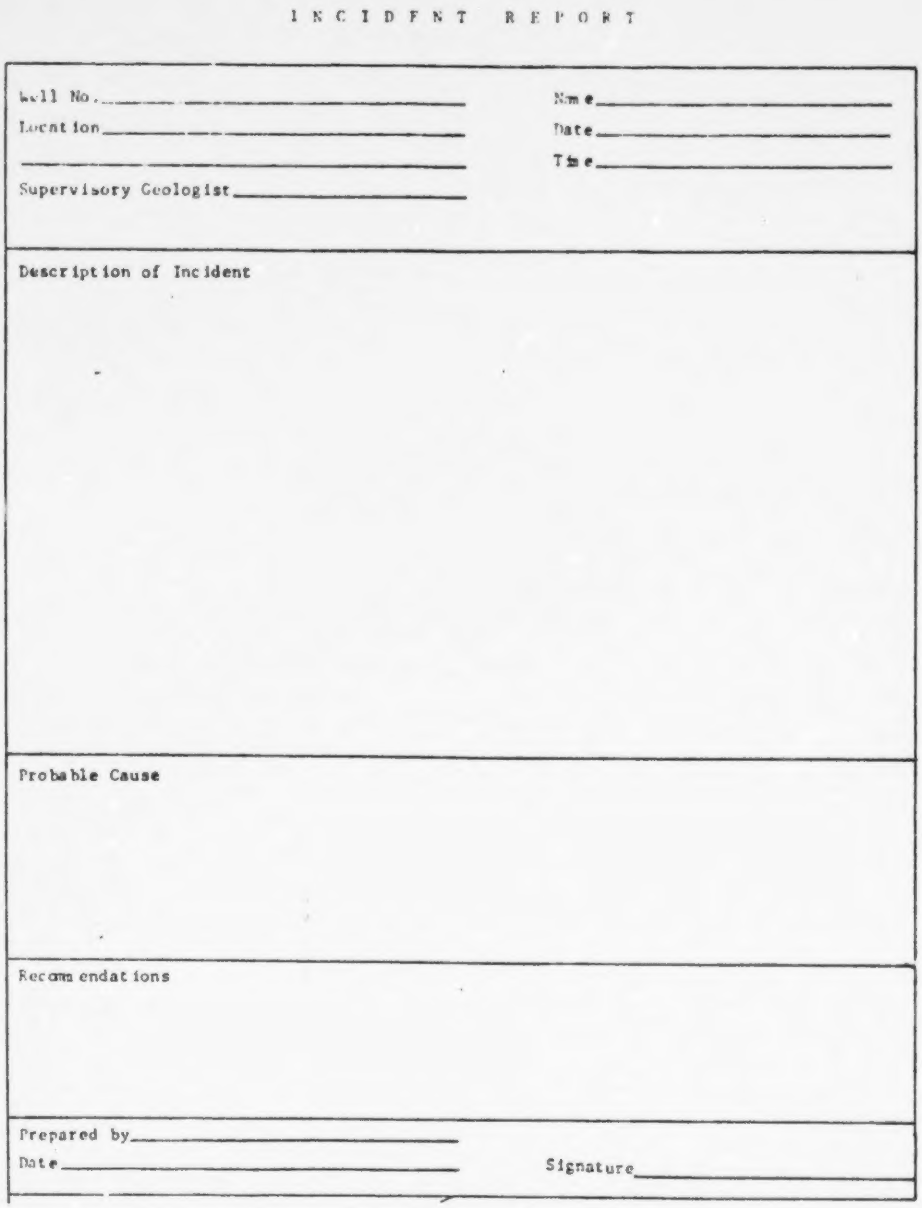
The supervisory geologist also has the authority to halt drilling or sampling operations for any reason including violations of the health and safety plan.

Role of Sampling Teams--

While at an active drilling site, sampling teams were under the direction of the supervisory geologist. At completed sites, sampling team members had the same responsibilities as those given above for supervisory geologists.

Role of Health and Safety Officer--

The primary responsibility of the JRB/SAI Health and Safety Officer was to develop the health and safety plan, and to ensure that it was followed by all personnel. Part of this responsibility included arranging medical exams for all JRB/SAI personnel. The Health and Safety Officer also had the authority to require the supervisory geologist to enforce the health and safety plan, or shut down drilling or sampling operations for violations of the health and safety plan.



INCIDENT REPORT

Well No.________ Name________

Location________ Date________

________ Time________

Supervisory Geologist________

Description of Incident

Probable Cause

Recommendations

Prepared by________

Date________ Signature________

Figure 17. Sample Incident Reporting Form.

SECTION 4

RESULTS

This section presents the results of JRB/SAI's activities at Love Canal. It is divided into three parts: the geologic and hydrologic characteristics of the bedrock aquifer; the characteristics of the overburden aquifer; and potential barriers to, and routes of, contaminant migration. These sections describe the general properties of the two aquifers and how these properties may influence contaminant movement from the Canal.

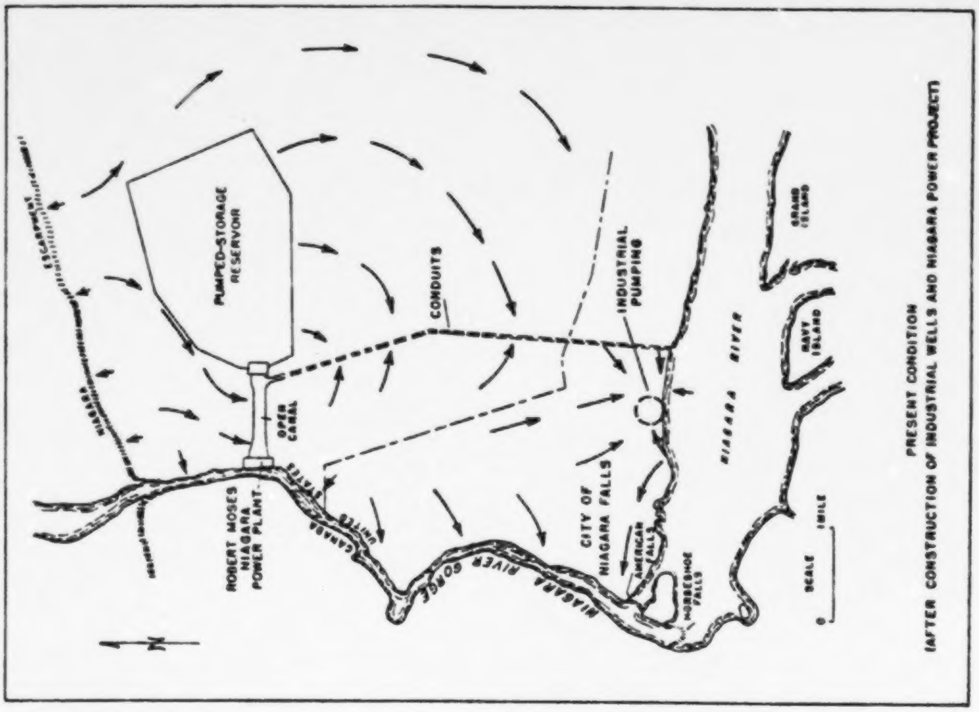
CHARACTERISTICS OF THE BEDROCK AQUIFER

The Lockport Dolomite is the major bedrock aquifer in the vicinity of Love Canal. It is a widespread, persistent rock unit, and is the first bedrock unit encountered during drilling. As stated in Section 2, depth to the bedrock in this area ranges from 6 to 12 meters (20 to 40 feet) below land surface, and is 49 to 55 meters (160 to 180 feet) thick (as determined by drilling). Its outcrop area extends from the Niagara Escarpment in the north to the Niagara Falls, where it forms the caprock of the Falls. It is continuously exposed in the Niagara Gorge and along the Niagara Escarpment. Outcrops are nonexistent in the study area, but on the basis of a distinctive one-inch shale zone near the base of the Lockport, the direction of dip was determined to be south eight degrees west at an angle of 0.6 degrees.

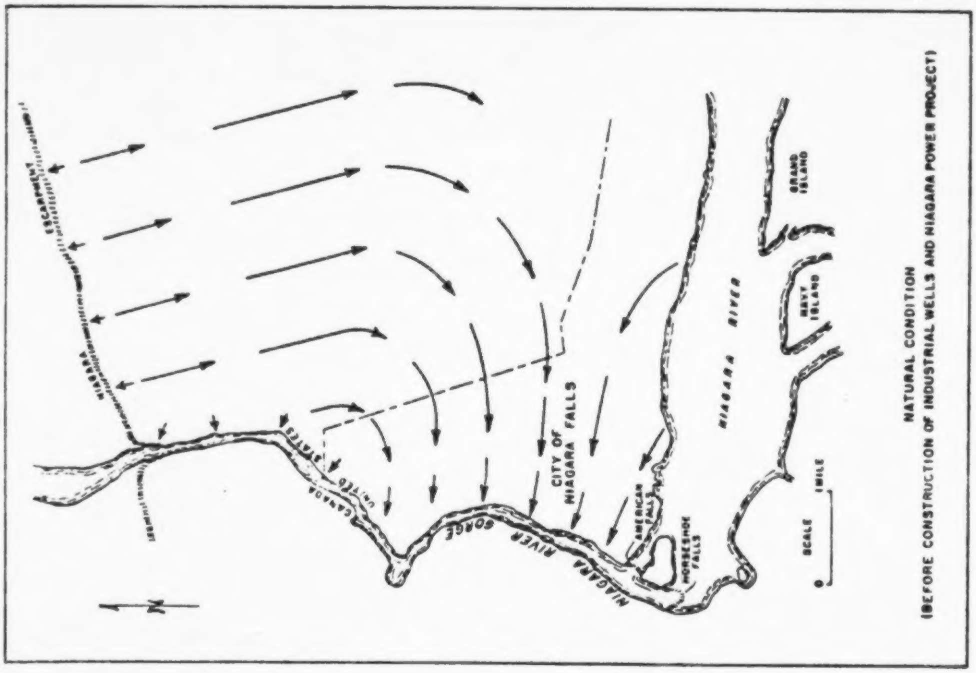
Rock types found in the Lockport are described in Section 2, and consist mainly of dolomite with minor amounts of limestone. Cores from the entire section of the Lockport in the Canal area were recovered from four wells (sites 42, 56, 72, and 86). All cores contained numerous shaley or carbonaceous partings throughout their length with some mineralized partings of calcite and gypsum. Vugs (cavities), either completely open or partially filled with calcite or gypsum, were common. An estimated 60 percent of the core from site 56 contained vugs. Most of these vugs are thought to be due to the solution of gypsum or calcite by ground water. Vugs range in size from only a few millimeters to several centimeters in diameter and, at least in the core samples, appear to be isolated and not interconnected. (Interconnected vugs would provide potential routes for contaminants.)

The regional ground-water flow in the vicinity of Niagara Falls is south and west toward the Niagara River. Figure 18 shows this regional flow. This regional pattern may be interrupted in places by such factors as: (1) excessive pumping from wells, (2) openings in the rock which provide paths for water flow in directions other than the regional flow direction, and (3) areas of high recharge. All of the above factors seemingly affect the regional flow pattern in the area of Love Canal.

The concentration of industrial plants on the north side of the upper Niagara River and the associated heavy pumping of water has deflected ground water flow in this area toward the industrial wells (see Figure 18). The



PRESENT CONDITION
(AFTER CONSTRUCTION OF INDUSTRIAL WELLS AND NIAGARA POWER PROJECT)



NATURAL CONDITION
(BEFORE CONSTRUCTION OF INDUSTRIAL WELLS AND NIAGARA POWER PROJECT)

Figure 18. Inferred Direction of Ground-water Movement in the Upper Water-bearing Zones of the Lockport Dolomite in the Vicinity of Niagara Falls (from Johnston 1964, p. 54).

exact area affected by this deflection is not known, but generally extends in a radius of several hundred feet from the most heavily pumped wells. The Niagara River also has a significant effect on the movement of ground water in the Lockport, especially in areas adjacent to the upper Niagara River above the Falls.

Two distinct water-bearing zones have been found in the Lockport:

- An upper zone at the top of the formation which is generally 3 to 5 meters (10 to 16 feet) thick and is characterized by vertical fractures and bedding planes which have been enlarged by solution or uplift.

- The lower 49 to 55 meters (145 to 170 feet) of the Lockport which is characterized by seven distinct zones having well-developed bedding plane separations.

Ground-water flow in the upper zone is affected by the major trends of the vertical fractures. Flow in the lower zone generally follows the down-dip direction of the formation.

Studies of the hydrogeologic conditions in the vicinity of the Niagara Falls Drinking Water Treatment Plant and Hooker's S Area Landfill (Leggette, Brahears and Graham, Inc., 1981) indicate that the ground-water flow in these areas is approximately 35 degrees west of north. Vertical fractures in the upper part of the Lockport observed in outcrops occur in two prominent sets, one set oriented 65 degrees east of north, and the other 30 degrees west of north. The northwesterly flow of ground water in the area is most likely following the northwest trending set of fractures. Data from Johnston (1964) indicates that ground water in the Lockport in the vicinity of the Upper Niagara River also flows in a northwesterly direction, parallel to the northwest trending fractures. One well reported by Johnston, located 200 feet from the upper Niagara River, is partly supplied by induced recharge from the river. This well has a transmissivity of 68,000 gpd/ft (gallons per day per foot), by far the highest transmissivity value reported in the Niagara Falls area, and almost certainly the result of flow through open fractures since bedrock dip is to the southeast.

As part of the JRB/SAI study, 89 bedrock wells were installed, 85 in the top 1.5 meters (5 feet) of the Lockport Dolomite, and 4 through the Lockport Dolomite to the top of the Rochester Shale. Water level measurements were taken in each of these wells at various stages during well construction and then again during October 23 and 24, 1980. Water level readings were corrected for changes in surface elevation and are expressed in feet relative to a common datum plane (mean sea level). Readings taken during October 23 and 24, one week after drilling operations had ceased and the aquifer system had presumably returned to equilibrium, were used to construct a contour map of the potentiometric surface. This map is given as Figure 19. Water level readings were taken to a hundredth of a foot. The contour interval used is one foot.

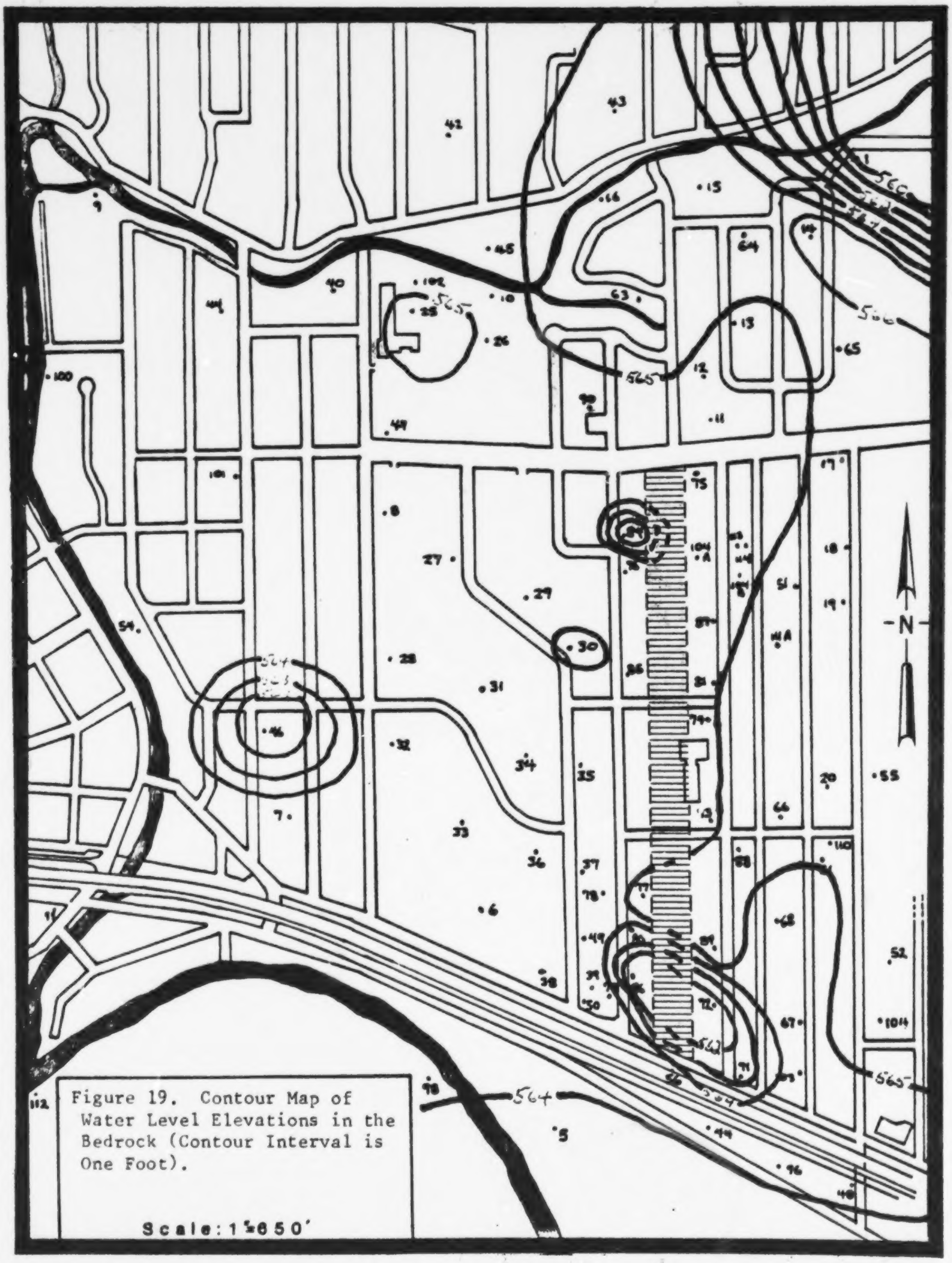


Figure 19. Contour Map of Water Level Elevations in the Bedrock (Contour Interval is One Foot).

As can be seen from the map in Figure 19, water levels in the bedrock wells vary between 559.93 and 565.72 feet above mean sea level with a slight gradient towards the Niagara River. Two low areas in the water level elevations can be seen adjacent to, and extending into the area of the Canal. Another low area can be seen between Pasadena Avenue and 92nd Street. A small high exists in the vicinity of the 93rd Street school. The contour lines show a general northwest-southeast trend throughout the area.

Water level readings in the study area indicate a gently undulating surface with highs and lows which trend northwest and northeast. These trends are roughly parallel to the two main fracture directions in the upper part of the bedrock. The low areas probably represent places where the fractures are open and water is able to flow laterally more rapidly than in other areas where the fractures are closed. In fact, B-wells located in this area had much higher discharge rates than other wells in the study area, possibly due to their proximity to open fractures.

Aquifer testing of the bedrock was conducted using pumping tests to determine the transmissivity and storage coefficient of the aquifer. Pumping tests were conducted on wells 56 and 72 which were both drilled to the base of the Lockport. Two pumping tests were done on well 72 and on well 56. The transmissivity and storage coefficient for the Lockport calculated from data obtained during these tests was 0.015 ft^2/s and 1.49×10^{-4}, respectively (Geotrans, 1981). The transmissivity value is higher than those reported by Johnston (1964) for the area near the Falls which supports Johnston's contention that the Lockport is more permeable near the upper Niagara River. The storage coefficient value is similar to that reported by Johnston (1964).

Results of these tests were used to draw the following conclusions:

- The Lockport Dolomite is not a homogeneous aquifer, but contains distinct water-bearing zones

- These upper permeable zones appear to have significant vertical permeability, because they responded quickly to pumping from a much deeper well

- The primary water-bearing zones are in the upper part of the aquifer

- Fractures appear to have a substantial effect on the rate and direction of ground-water movement in the upper portion of the bedrock.

During the pumping tests, water level readings were taken in nearby overburden wells. At no time during these tests did drawdown occur in the shallow overburden wells. This would indicate that there is little, if any, hydraulic connection between the overburden and the bedrock in the wells tested. However, it is possible that there is a greater hydraulic connection in areas where no wells exist.

CHARACTERISTICS OF THE OVERBURDEN AQUIFER

As noted in Section 2, the overburden material can be considered as four more or less distinct layers or units. From the bedrock up, these are:

- Glacial till
- Lower, wet, silty clay
- Upper, firm, silty clay
- Surface soils and fill.

Each of these units will be discussed with regard to its relationship to water movement in the overburden.

Glacial Till

In general, the glacial till ranges from an approximate thickness of 0.3 meter (1 foot), to 7.6 meters (25 feet). Figure 20 illustrates the till thickness as plotted from JRB/SAI well logs. The thickest till was found just east of the southern end of the Canal, and the thinnest to the north, in the area of Black Creek. A large area of till less than 1.5 meters (5 feet) thick was found to extend westward from site 13 along Bergholtz Creek. A smaller area of thin till was also found just northeast of the 99th Street school.

For the most part, the till (as described from 13 split-spoon samples) was found to be composed of a reddish brown, silty clay containing from 20 to 60 percent gravel (2 mm to 7.5 cm in diameter) and some cobbles (7.5 cm to 25 cm). In most cases, this material was moist and firm to very firm. Variations were found primarily in color and texture, with two samples having a dark grayish brown to grayish brown color, and three samples having a sandy clay matrix surrounding the gravel.

Permeability in the glacial till was found to be extremely low. Analysis of the results from the slug test performed on well T-4 (screened in the till) by Geotrans, Inc. indicate that the permeability of this unit is approximately 7.6×10^{-9} cm/sec. (0.25×10^{-9} ft/sec.). These rates are far lower than those reported by Johnston (1.08×10^{-3} cm/sec or 3.3×10^{-2} ft/sec.). However, Johnston also reported the occurrence of sandy layers within the till where water could move quite rapidly. In general, the till appears to be a low permeability layer with small areas of higher permeability scattered throughout it.

Lower, Wet, Silty Clay

The lower silty clay unit has a general thickness range of 0.6 meter (2 feet) to 3 meters (10 feet). The two silty clay units together are thin where the till is thick, and thick where the till is thin. This is not unusual for lake-laid sediments, and accounts for the absence of any expression of the three lower units in the present landscape. Figure 21 is a contour map of the thickness of both clay units.

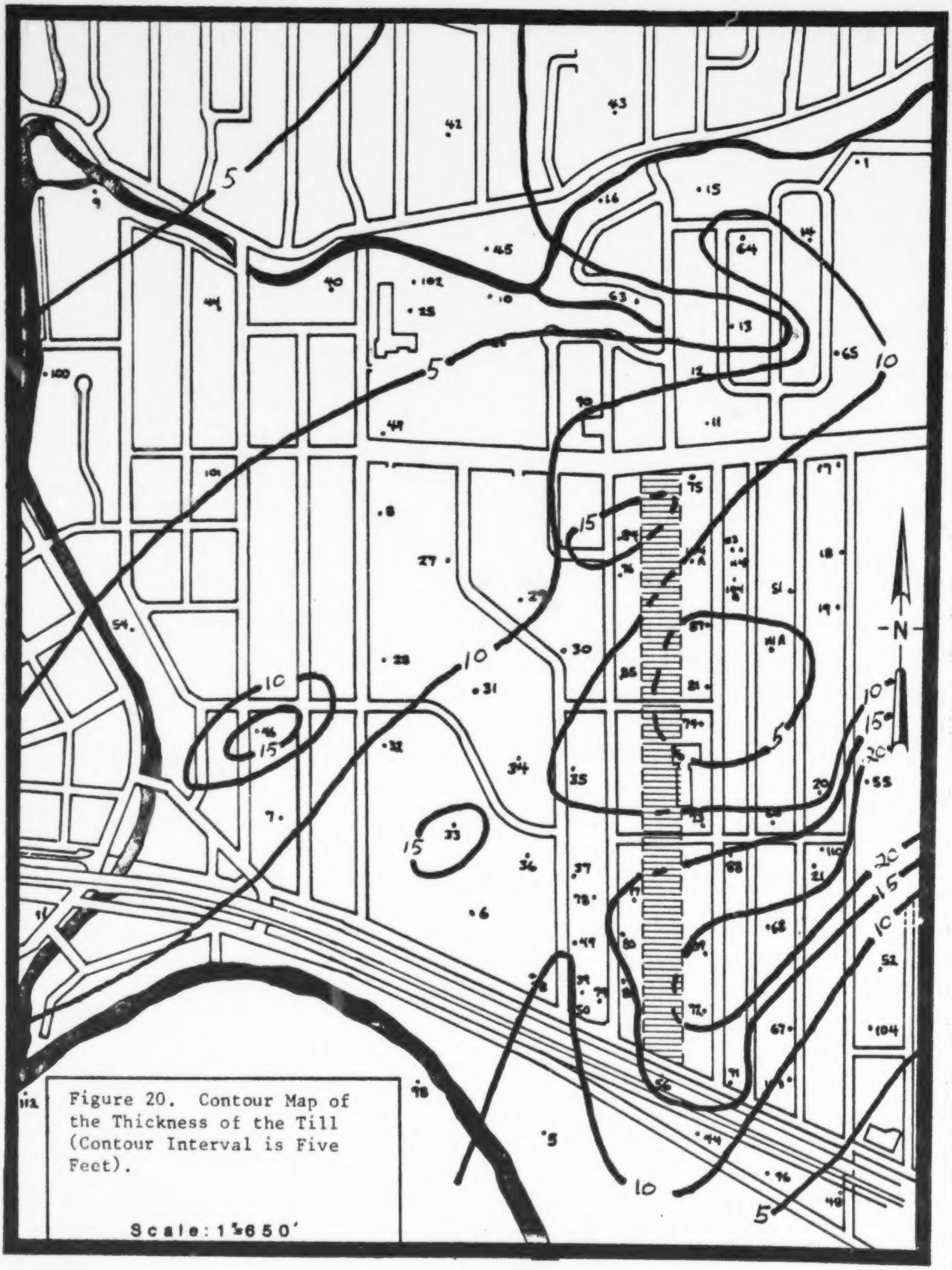


Figure 20. Contour Map of the Thickness of the Till (Contour Interval is Five Feet).

Scale: 1"=650'

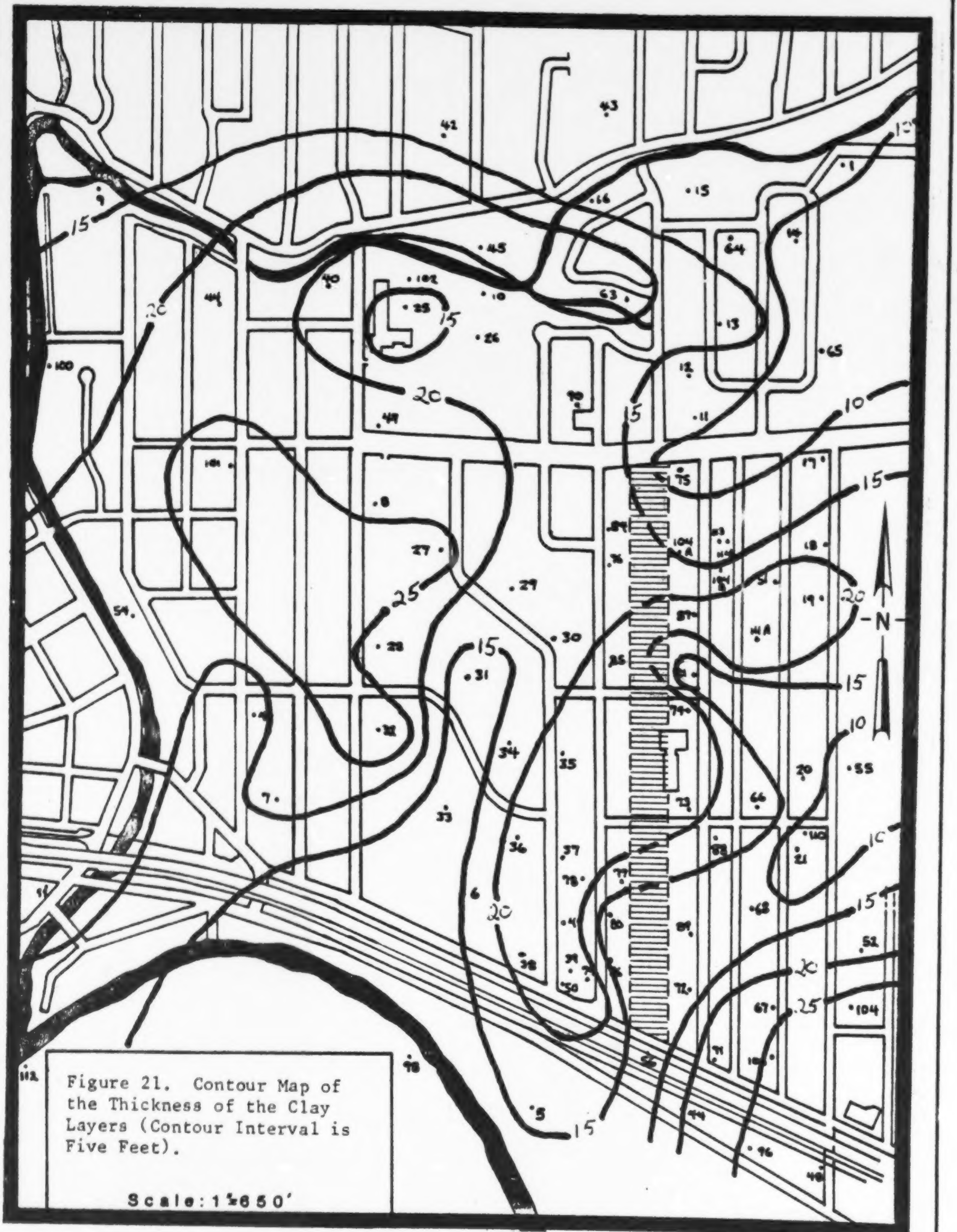


Figure 21. Contour Map of the Thickness of the Clay Layers (Contour Interval is Five Feet).

As noted earlier, the lower clay unit is composed of fine layers of clay and silt (varves) giving the material an overall texture of silty clay. The colors are predominantly reddish brown with a few mottles of yellow, gray, and black. As described from both split-spoon samples and auger cuttings, this silty clay was moist to saturated, very plastic, and very sticky. The greatest variation in this unit was found in color and moisture content, however, these variations were not large.

Based on observed characteristics and the results of the slug test, this unit was found to be only slightly more permeable than the underlying till. Geotrans, Inc. calculated the permeability to be 9.7 x 10^{-9} cm/sec. (0.32 x 10^{-9} ft/sec.) in the upper half of this unit, and 3.7 x 10^{-8} cm/sec. (1.2 x 10^{-9} ft/sec.) in the lower half from the slug tests on wells T-2 and T-3. These values are also several orders of magnitude lower than those reported by Johnston. In an overburden well north of the Niagara Escarpment, Johnston used recovery data to calculate a permeability of 1.8 x 10^{-6} cm/sec. (5.9 x 10^{-5} ft/sec.) for both the upper and lower silty clays.

Upper, Firm, Silty Clay

The boundary between the lower, soft silty clay unit, and the upper, firm silty clay unit is based mainly on a moisture change, and is indistinct. The upper unit grades to fill material and surface soils, and is approximately the same thickness as the lower silty clay unit.

The upper silty clay unit was found to be mostly reddish brown, but was dark grayish brown, grayish brown, and yellowish brown in places. The texture was predominantly silty clay, but included some sandy clay and clay as well. This unit was also described as somewhat moist to moist, firm to very firm, and highly mottled. Although this unit is described in the literature as having dehydration cracks in the upper portion, they were not seen in any samples described by JRB/SAI. However, the cracks may have been obscured in even the split-spoon samples because of the mechanics of the sampling process.

Assessing the effectiveness of dehydration cracks as ground-water migration routes is difficult because it is impossible to map them from soil borings. However, that they do transmit leachate, at least in the vicinity of the Canal, is irrefutable based on the direct observations of Clement Associates (1980, p.49). Furthermore, indirect evidence that these cracks may also increase the permeability of the clays includes the following:

- Most A-wells were dry when first installed, but had several gallons of water in them within 24 hours. This rate of well recharge is 1 to 2 orders of magnitude higher than the permeabilities and gradients estimated for the upper clays would allow.

- The lower clays were moist to wet almost everywhere in the study area while the upper clays were dry to moist, even after heavy precipitation. Since the lower clays receive their recharge from above, much of the water appears to have bypassed the bulk of the upper clays in reaching the lower clays.

This evidence is certainly not conclusive, but it does suggest that there is some mechanism which increases ground-water and contaminant movement rates over what field permeability tests indicate. Dehydration cracks are one transport route which may account for these differences.

Three-quarters of the screen, or some 1.2 meters (3.9 feet), set in test well T-1 was exposed to the upper silty clay unit. The upper quarter of the screen was exposed to the surface fill materials. Consequently, the slug test analysis by Geotrans, Inc. is not likely to be truly representative of the upper clay unit. The calculated permeabilities range from 2.3 x 10^{-8} cm/sec. to 7.6 x 10^{-8} cm/sec. (0.74 x 10^{-9} to 2.5 x 10^{-9} ft/sec.). These values are in the very low permeability range, and are also much lower than those determined by Johnston (i.e., 1.8 x 10^{-6} cm/sec. or 5.9 x 10^{-5} ft/sec.).

Surface Soils and Fill

Above the upper silty clay unit, a variety of local and transported materials was found. In some areas, the texture of these materials remained fine (silty clay to sandy clay) to the surface. Much of these materials appeared to be local in origin. In other areas, layers of coarser materials, including sands, loamy sands, sandy loams, and loams were found. These materials were most often yellowish brown, olive brown, or brown, and were extremely wet. These layers varied in thickness from about 3 centimeters (0.1 foot) to about a meter (3.3 feet), and were also a mixture of natural, undisturbed material, and fill.

A contour map of the thickness of soil materials coarser than loam is shown in Figure 22. This map was compiled using JRB/SAI well logs and split-spoon descriptions as well as split-spoon descriptions collected by Geomet, Inc. It indicates that there are large areas of near-surface coarse materials capable of transmitting water with the thickest areas in the vicinity of both the 93rd Street and 99th Street schools, and in the southeast corner of the study area.

Unfortunately, the shallowest slug test well, T-1, was screened in only a very small portion of these coarser materials, and did not yield results representative of them. No estimates for the permeability of these materials was found in the literature; however, based on their texture, the permeabilities would likely be 1 x 10^{-2} cm/sec. (3.3 x 10^{-4} ft/sec.) or greater.

Water Movement in the Overburden

As described above, most of the overburden appears to be of low to very low permeability. Local channels of higher permeability are quite likely wherever the silty clays have been disturbed by trenching activities or where sandy layers are present. The coarse, near-surface materials are much more capable of transmitting water than most of the rest of the overburden. Although this investigation took place during the drier part of the year, these materials were quite wet, and the gray and olive colors indicate they are saturated for much of the year.

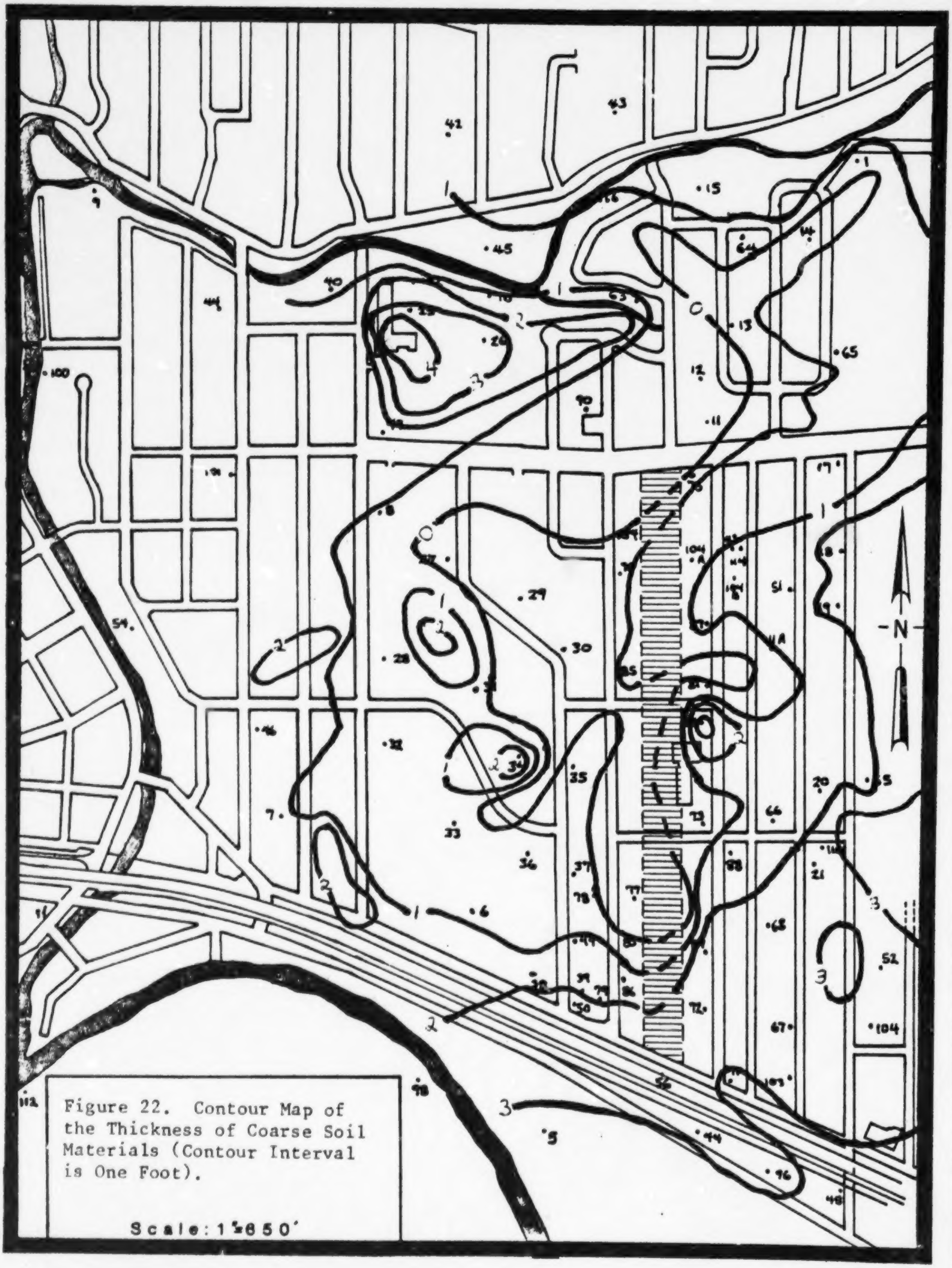


Figure 22. Contour Map of the Thickness of Coarse Soil Materials (Contour Interval is One Foot).

Figure 23 is a contour map of the elevations of the potentiometric surface in the overburden based on 89 A-wells. By comparing this map with the contour map of the potentiometric surface in the bedrock (Figure 19), it can be seen that ground-water movement in the overburden is much more complex than water movement in the bedrock. In general, water movement in the overburden is to the west and northwest, and is linked to surface drainage pattern. The ground-water high trending northwest-southeast at the northern end of the Canal is probably related to the major swale shown in Figure 5. The high near the 93rd Street school may be due to higher permeability fill materials being used during construction of the school. Other complexities in the ground-water flow patterns are probably due to changes in permeability, caused by textural or structural variations in the overburden materials, or other reasons. Interpretations of the maps shown in Figures 19 and 23 should be made with caution, however, since the maps are based on data obtained over a very short time period, and hence do not reflect seasonal changes.

POTENTIAL BARRIERS TO, AND ROUTES OF, CONTAMINANT MOVEMENT

Bedrock Aquifer

Previous studies have assumed that the Rochester Shale will prevent any contaminant movement between the Lockport Dolomite and underlying formations. Cores from the top of this unit taken from the four C-wells appeared very dense and unfractured. Because this highly impermeable, unfractured strata averages 18 meters (60 feet) in thickness, contaminant movement through it is improbable. Should contaminants exist in the bedrock, they would be more likely to discharge to the Niagara River than pass through this shale.

One barrier to downward water movement not noted previously is the upper 5 centimeters (2 inches) to 30 centimeters (1 foot) of the bedrock. This layer appears to retard water movement because:

- In drilling B- and C-wells, there was generally no loss of drilling water until after this layer had been passed
- The bottom of the till overlying bedrock was rarely wet unless the entire till unit was also wet.

Moisture in the till, then, apparently comes predominantly from the overlying clays rather than the underlying bedrock. Consequently, contaminants which do pass through the till may remain on the top of the bedrock rather than passing through to the main water bearing portion of the Lockport.

One possible explanation for this unexpected impermeability in the top of the Lockport is that this layer is not really the Lockport at all. Rather, it could be a part of the overlying Salina Group called the Camillus Formation (Kernan Davis, personal communication). The Camillus is a shaley dolomite which differs from the Lockport in its slightly higher clastic content and slightly darker color. In cores taken from the study area, this upper layer appeared as a medium to dark olive gray, fine-grained carbonate having numerous horizontal shaley laminations and partings. This layer graded into the

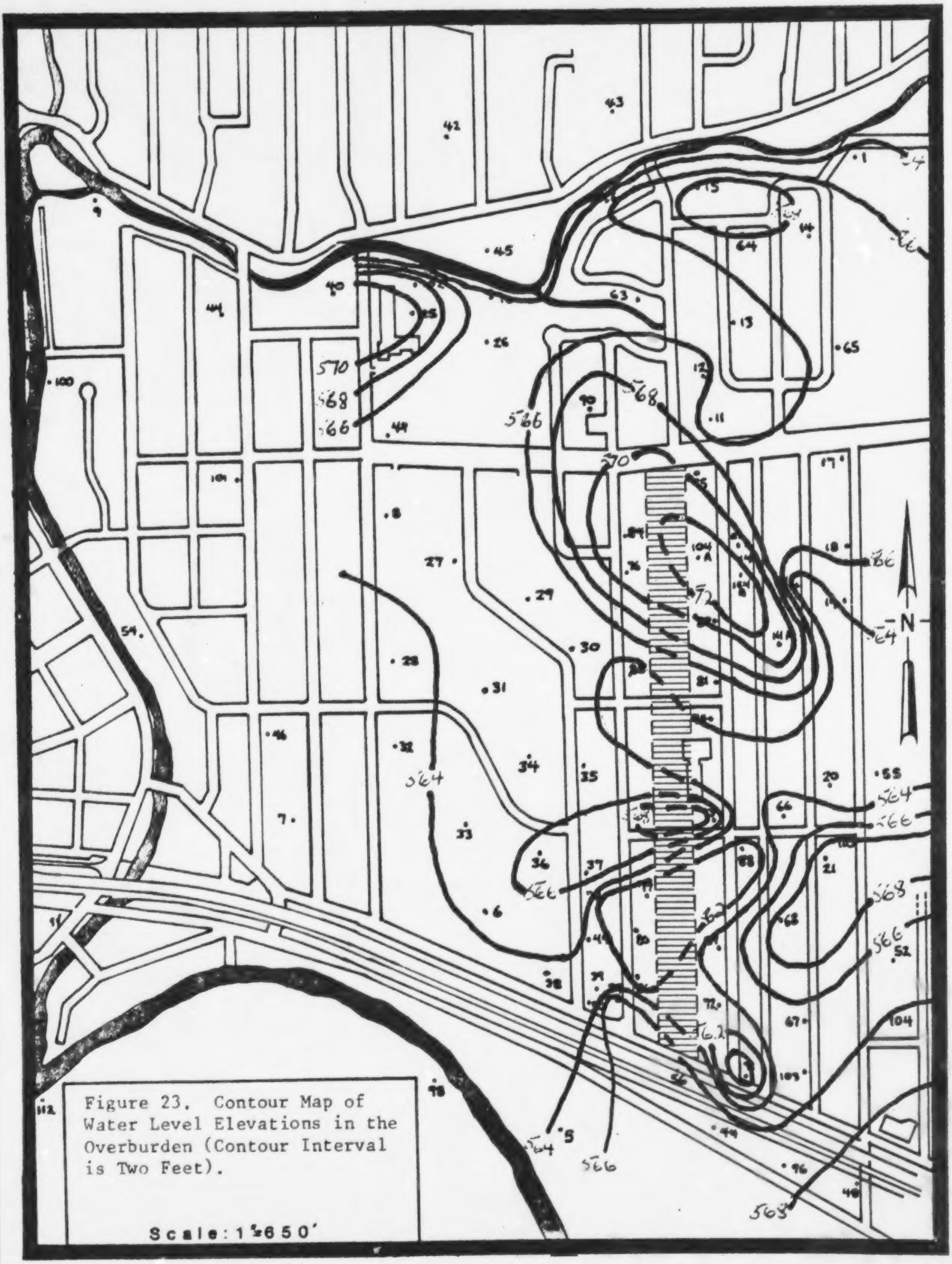


Figure 23. Contour Map of Water Level Elevations in the Overburden (Contour Interval is Two Feet).

Scale: 1"=650'

lighter gray, massive, Lockport Dolomite. While it is highly impermeable, the Camillus is fairly soft and weathers rapidly where it does crop out near the village of Lasalle. Whether this layer is, indeed, the Camillus is not really important except it is one possible explanation for the impermeability of the top layer of the bedrock. What is important is that, generally, this layer acts as a barrier to water movement.

One notable exception to this generalization was found at well 72-C. In this well, the entire till was moist and drilling fluids were lost almost immediately in the process of coring the borehole. Furthermore, the well produced as much as 257 liters (68 gallons) per minute during pre-pumping test trials. In contrast, most B- and C-wells in the study area produced less than 57 liters (15 gallons) per minute. The explanation for this anomoly is that well 72-C almost certainly penetrates a major vertical fracture. Consequently, the top of bedrock will be an effective barrier only if it is not breeched by open fractures. Where fractures do penetrate this layer, it will not retard water or contaminant movement.

Potential migration routes for contaminants in the bedrock aquifer are along paths provided by openings in the rock. These potential routes include:

- Bedding plane separations
- Vertical fractures
- Cavities (vugs) which are interconnected.

The bedding plane separations in the bedrock provide the most obvious potential migration routes for contaminants. They are natural planes of weakness in the rock formed as the rock was deposited and can be seen in outcrop as well as in drill cores. These planes of weakness have been opened and enlarged by two geologic activities which have affected the Lockport Dolomite subsequent to its deposition--solution by ground water, and vertical uplift of the area during the formation of the Appalachian Mountains and the more recent recession of continental glaciers from the region. Solution is a common process in carbonate rocks where water is, or has been, available. Water carrying weak acids dissolves the carbonate rock. The effect of solution is to cause or enlarge openings in these rocks, thereby creating routes along which fluids may easily migrate. Vertical uplift affecting essentially flat-lying rocks causes separations to occur along planes of weakness.

Vertical fractures are commonly formed in the upper parts of rocks as a result of extension created during vertical uplift. As compressive forces, such as those caused by overlving earth materials or the weight of an overlying glacier, are removed from the rock, the rock moves upwards causing tension cracks or vertical fractures to form. These cracks or fractures provide potential migration routes for contaminants in the upper part of the bedrock.

Cavities or vugs have formed in the Lockport due to the dissolving of soluble minerals. Accumulations of the soluble minerals calcite and gypsum developed as the Lockport Dolomite was being formed. These minerals were subsequently dissolved by ground water circulating within the formation, leaving cavities or vugs. Potential migration routes for contaminants exist where these are interconnected. However, few of the vugs examined in bedrock cores appeared to be connected.

The most likely routes for the potential migration of contaminants in the bedrock are the bedding planes and fractures. Ground water is able to flow readily along these features because they are open spaces in the rock which extend for considerable distances throughout the Love Canal area. The bedding planes dip slightly to the south-west, and ground water flow in the Love Canal area appears to be in a down-dip direction. This flow direction is also roughly parallel to the direction of one of the sets of fractures.

Overburden Aquifer

The two main barriers to water and contaminant transport in the overburden are the clays and the till. The clay layers overlying the till have not previously been considered as important a barrier as the till, possibly because of the dehydration cracks and because they have been found to be contaminated (Clement Associates, 1980, p.49). Nevertheless, because of their low permeabilities and the typically high attenuation capacity of clays in general, they should be considered as at least a potential barrier to contaminant transport.

The till has been cited in previous studies as the primary barrier to contaminant transport into the bedrock. Since few earlier investigations installed wells which penetrated the till, this hypothesis had not been verified. It had been thought that as long as the till does not pinch out (i.e., as long as there are no holes in the till where the clays rest directly on bedrock) it would be an effective barrier. Although, the till does pinch out in other parts of Niagara County (e.g., near Hooker Chemical Company's "S-Area" disposal site) there is no direct evidence that it does near Love Canal. However, no wells penetrate the Canal itself, and there are no records which might indicate whether the till was removed during the Canal's excavation. Consequently, it is possible that the till may be absent directly under the Canal.

The thinnest till encountered during this investigation was at site 45 where it was approximately 21 centimeters (0.7 foot) thick. Of course, there may be parts of the study area where the till does pinch out, that were not penetrated by wells. Based on the till thickness map (Figure 20), the most likely natural areas of no till are near the central portion of the Canal and to the northwest of the Canal near the 93rd Street school. Although there appears to be no anomolously high water levels that can be linked to thin or absent till, this may be due to the impermeable top layer of bedrock or to the clays.

Most of the till encountered in the study area had a clay to a silty clay matrix. However, some parts of the till have much lower precentages of clay, and a much higher percentage of silt or sand in the matrix (e.g., Site 83) which make the unit more permeable than previously thought. Furthermore, deposits of clayey or silty till and glaciolacustrine clays such as those found at Love Canal, can have networks of hairline fractures. Freeze and Cherry (1979, pp 151-2) note that:

> The fractures are predominantly vertical or nearly vertical. The distance between the fractures varies from several centimeters to many meters...In some cases the fractures pass through successive layers of till and clay. In other cases, they are restricted to individual layers.
>
> In many areas, the fractures impart an enhanced capability for ground water flow. The bulk hydraulic conductivity of fractured till and clay determined by field tests is commonly between 1 and 3 orders of magnitude larger than values of intergranular hydraulic conductivity determined by laboratory tests on unfractured samples. As a result of increased lateral stresses caused by overburden loading, the hydraulic conductivity of fractured till and clay decreases with depth, but because of the stiffness of many of these materials the fractures can provide significant secondary permeability to depths of hundred of meters.

If these fractures do exist in the clays and till at the Canal, they may be extensions of the bedrock fractures. Should this be the case, these fractures would provide routes for contaminants to move through the overburden to bedrock. It is impossible, however, to verify the existence of these fractures even from split-spoon samples because the fractures are generally so small that they are destroyed in the sampling process. However, an examination of aerial photographs of the undeveloped area east of the Canal revealed subtle linear features (i.e., differences in vegetation or soil colors which probably reflect differences in soil moisture) which follow the same trends as the bedrock fractures. While this type of feature is not direct evidence of fractures, it has been used commonly in photohydrogeologic work as an indicator of higher permeability zones.

Although it is not possible to prove directly that fractures or sands and silts in the till are significant water transmitting zones, there is some evidence based on the moisture content of the till to indicate that this is, indeed, the case. First, in over 50 percent of the wells in which the till was found to be saturated, the till's matrix was more sand- or silt-rich than was typical for the area. This higher proportion of sand and silt (and thus, lower proportion of clay) in the matrix could certainly contribute to higher permeabilities. Second, many of the wells in which the till was wet or moist lie among the same trends as the bedrock fractures (e.g., wells 8, 31, 34, 37, 78, 86, 56, and 44 trending 30 degrees west of north; and wells 17, 114, 113, 76, 30, 31, and 32 trending 65 degrees east of north). If fractures do penetrate the till, they too would probably be zones of higher permeability. Furthermore, the moisture content of the till appears to be independent of till thickness, clay thickness, fill thickness, and the water levels in both the overburden and the bedrock. While these observations are not conclusive, they do suggest that the till is probably not as effective a barrier as previously thought, although it does retard water movement somewhat.

Swales are probably also important routes of contaminant transport. The contour map of the potentiometric surface in the overburden (Figure 23) shows higher water levels between the north end of the Canal and the 93rd Street school. These higher levels may be related to the higher permeability materials found in the major swale that crosses the Canal (swale number 1 in Figure 5). Hence, water-borne contaminants that enter this swale could conceivably migrate away from the site to the norhtwest and possibly discharge into Bergholtz Creek. While there are also several other similarities between the locations of swales and the water levels in the overburden, it is difficult to evaluate these relationships without more data on seasonal fluctuations in the water table.

SUMMARY

As described previously, the top of bedrock, the till, and the clays can all act as barriers to water and contaminant movement. However, none of these geologic layers is uniform enough to ensure that contaminants will not migrate outside the immediate vicinity of the Canal. Table 7 outlines the hypothetical relative effectiveness of these geologic layers based on their physical condition. This table clearly illustrates why the hydrogeology of the Love Canal area is so complicated since the different conditions of the layers probably occur in many different combinations. (For example, the top of rock may be fractured and the till may be very sandy, but if the clays are thick, very dense, and have no cracks or fractures, then there may, in fact, be a fairly effective barrier.) Thus, it is nearly impossible to predict whether there is an effective barrier between the Canal and bedrock at any given point in the study area. However, there will almost certainly be areas where none of the three layers are totally effective in preventing contaminant migration to bedrock.

Should contaminants enter the bedrock aquifer, flow would most likely occur along the fractures and bedding plane separations. Because these features in the bedrock have been enlarged by solution and glacial rebound, and are persistent over a large area, rapid long-distance movement of contaminants is possible. Contaminants in the bedrock aquifer would almost certainly discharge to the Niagara River over time.

The indirect hydrologic evidence cited previously, suggests that contaminants in the overburden that are outside the leachate collection system, could migrate through swales, sandy zones in the fill, clays, and fill, and perhaps dehydration cracks in the clay. Contaminants within the confines of the collection system should either remain in place, or be collected for treatment, unless the till is absent beneath the Canal. Because of the highly variable nature of the materials of the overburden, however, these routes are probably not continuous throughout the study areas, as are the routes in the bedrock aquifer. Hence, they may not transmit contaminants for long distances, and pockets of contaminants may become trapped in places (such as in unfractured depressions at the top of the bedrock). However, long-term ground-water and contaminant monitoring data is needed before seasonal changes in flow patterns can be assessed.

Table 7. The Hypothetical Effectiveness of the Clays, the Till, and the Top of Rock as Retardants to Contaminant Movement

Relative Effectiveness in Retarding Contaminant Movement	Retarding Geologic Layer		
	Top of Bedrock	Till	Clays
Fairly Effective	Where not fractured and of sufficient thickness	Where the matrix is predominantly clay and there are no hairline fractures	Where thick and not excessively sandy or silty, and where there are no dehydration cracks or hairline fractures
Somewhat Effective	Where fairly thin or where fractures are not open	Where the matrix is a clayey silt, or where there are minor hairline fractures	Where thin or where there are minor sand stringers or dehydration cracks
Not Effective	Where well fractured	Where the matrix is predominantly silty or sandy, where well fractured, or where it pinches out	Where thin, cracked, fractured, or very sandy

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APPENDIX A:

ELEVATION AND THICKNESS DATA

SITE NUMBER	LAND SURFACE ELEVATION[1]	FILL THICKNESS (FEET)[2]	CLAY ELEVATION[1,2]	CLAY THICKNESS (FEET)[2]	TILL ELEVATION[1]	TILL THICKNESS (FEET)	BEDROCK ELEVATION[1]
1	572.5	2	570	13	557.5	6.0	551.5
2	571.2	4	567	16	552.2	1.5	550.7
3	573.4	0	573	10	563.4	19.0	544.4
4	571.8	1	571	24	546.3	8.5	537.8
5	573.4	16	557	16	541.4	6.0	535.4
6	572.1	4	568	15	553.1	11.2	541.9
7	573.4	5	568	23	545.4	8.0	537.4
8	573.2	3	570	22	548.2	9.0	539.2
9	573.4	5	568	12	556.4	6.5	549.9
10	569.5	2	567	18	549.5	2.0	547.5
11	572.4	4	568	13	555.9	12.8	543.1
12	572.4	5	567	12	555.4	Unknown	Unknown
13	572.3	4	568	16	552.3	1.0	551.3
14	572.8	7	565	7	550.3	8.0	551.3
15	573.4	4	569	13	556.4	9.5	546.9
16	572.8	4	569	13	555.3	8.7	546.6
17	572.2	4	568	14	553.7	6.5	547.2
18	573.7	4	570	18	551.7	8.0	543.7
19	573.2	4	469	20	549.7	8.0	541.7
20	574.2	8	566	14	552.7	9.0	543.7
21	575.3	7	568	10	557.8	16.2	541.6
25	574.1	10	564	12	551.6	4.4	547.2
26	571.1	2	569	18	551.1	5.0	546.1
27	573.3	2	571	25	546.3	7.5	538.8

APPENDIX A: (continued)

SITE NUMBER	LAND SURFACE ELEVATION[1]	FILL THICKENSS (FEET)[2]	CLAY ELEVATION[1,2]	CLAY THICKNESS (FEET)[2]	TILL ELEVATION	TILL THICKNESS (FEET)	BEDROCK ELEVATION[1]
28	572.9	2	571	24	546.9	8.6	538.3
29	573.3	3	570	19	551.3	9.2	542.1
30	573.2	6	567	18	549.2	11.2	538.0
31	573.1	9	564	13	551.6	13.0	538.6
32	573.2	1	572	25	547.2	10.3	536.9
33	573.6	4	570	15	554.6	17.3	537.3
34	573.5	5	568	17	551.5	13.2	538.3
35	572.6	4	569	21	547.6	8.0	539.6
36	573.9	4	570	20	549.9	10.5	539.4
37	573.4	3	570	21	549.6	10.4	539.2
38	573.0	4	569	20	548.8	10.9	537.9
39	574.1	4	570	22	548.0	13.0	534.1
40	573.2	6	567	17	550.2	4.0	546.2
41	572.7	2	571	22	549.2	2.8	546.4
42	573.1	7	566	13	553.1	2.8	550.3
43	574.1	2	572	15	557.1	6.7	550.4
44	574.6	5	570	20	549.1	14.5	534.6
45	571.5	1	570	21	549.3	0.7	548.6
46	573.9	4	570	19	550.9	15.0	535.9
47	571.9	2	570	20	549.4	7.7	541.7
48	574.6	7	568	28	539.6	3.8	535.8
49	574.3	6	568	21	547.3	7.7	539.6
50	573.9	4	570	24	545.9	10.0	535.9
51	573.7	2	572	21	550.7	6.4	544.3
52	575.9	6	570	19	550.9	9.6	539.1
54	570.9	7	564	20	543.9	6.0	537.9
55	573.8	8	566	6	559.8	24.8	535.0
56	574.9	7	568	14	553.9	16.2	537.7
63	572.9	1	572	23	549.3	3.7	545.6
64	572.2	1	571	11	559.7	11.8	547.9
65	572.5	6	567	9	558.0	11.2	546.8

APPENDIX A: (continued)

SITE NUMBER	LAND SURFACE ELEVATION[1]	FILL THICKNESS (FEET)2	CLAY ELEVATION[1,2]	CLAY THICKNESS (FEET)2	TILL ELEVATION[1]	TILL THICKNESS (FEET)	BEDROCK ELEVATION[1]
66	574.9	4	571	18	552.9	11.7	541.2
67	574.3	1	573	25	548.3	13.0	535.3
68	574.6	2	573	13	560.4	23.8	536.6
71	575.1	2	573	21	552.1	17.5	534.6
72	573.4	3	570	13	557.9	20.0	537.9
73	574.3	2	572	21	551.3	12.8	538.5
74	575.4	8	567	23	544.9	1.0	543.9
75	574.1	8	566	7	558.6	14.5	544.1
76	574.9	6	569	17	551.9	11.6	540.3
77	575.7	3	573	20	552.7	16.0	536.7
78	575.0	4	571	20	551.0	Unknown	Unknown
79	575.1	4	571	22	549.1	14.2	534.9
80	573.5	7	567	13	554.0	17.3	536.7
81	575.1	5	570	14	546.1	1.8	544.3
82	575.0	8	567	19	548.0	3.0	545.0
83	574.5	5	570	21	548.5	4.8	543.7
84	574.4	2	572	18	554.4	15.4	539.0
85	573.2	4	569	22	546.7	9.1	537.6
86	574.0	6	568	16	551.5	13.2	538.3
87	574.0	4	570	21	549.0	3.5	545.5
88	574.9	4	570	18	552.5	Unknown	Unknown
89	574.7	6	569	13	555.7	21.0	534.7
90	573.1	4	569	17	552.6	10.0	542.6
96	574.1	6	568	29	538.6	7.1	531.5
98	568.0	2	566	18	548.0	12.2	535.8
99	576.0	8	568	25	543.0	6.3	536.7
100	574.0	6	568	17	551.0	2.5	548.5
101	572.9	3	570	25	544.9	5.0	539.9
102	573.6	2	572	18	553.6	Unknown	Unknown
103	574.4	5	569	25	544.4	8.8	535.6
104	573.9	4	570	15	554.6	8.7	545.9

APPENDIX A: (continued)

SITE NUMBER	LAND SURFACE ELEVATION[1]	FILL THICKNESS (FEET)[2]	CLAY ELEVATION[1,2]	CLAY THICKNESS (FEET)[2]	TILL ELEVATION[1]	TILL THICKNESS (FEET)	BEDROCK ELEVATION[1]
108	572.8	3	570	22	547.3	8.2	539.1
109	571.5	1	570	28	542.5	6.5	536.0
110	574.4	6	568	10	558.4	19.5	538.9
111	574.3	3	571	Unknown	Unknown	Unknown	Unknown
112	565.7	3	563	17	545.7	12.8	532.9
113	574.7	4	571	14	556.7	Unknown	Unknown
114	574.8	4	571	Unknown	Unknown	Unknown	Unknown

1) Elevation in feet above mean sea level

2) These are approximate values since the boundary between the fill or native soil materials and the clays was not distinct.

APPENDIX B

WATER LEVEL MEASUREMENTS
BEDROCK WELLS

Well Number	Date (1980)	Time	Depth to Water[1]	Water Level Elevation[2]
1B	10/23	0810	12.20	559.93
3B	10/23	0940	7.45	565.31
4B-2	10/23	0745	6.15	565.39
5B	10/22	1850	9.58	563.37
6B	10/23	1540	6.90	564.71
7B	10/23	1350	8.25	564.63
8B	10/23	1410	7.90	564.73
9B	10/23	1330	7.85	564.71
10B	10/23	1140	4.38	564.75
11B	10/23	0910	7.00	564.90
13B	10/23	0835	6.65	564.97
14B	10/23	0820	5.73	566.19
15B	10/23	0845	7.34	565.40
16B	10/23	0900	7.20	565.25
17B	10/23	0920	6.80	565.35
18B	10/23	0925	7.75	565.27
19B	10/23	0935	7.35	565.33
20B	10/23	0955	8.80	565.04
21B	10/23	1040	9.25	565.00
25B	10/23	1150	8.95	564.72
26B	10/23	1145	6.10	564.66
28B	10/23	1405	8.00	564.66
29B	10/23	1422	8.12	564.83
30B	10/23	1430	8.63	563.93
31B	10/23	1439	7.89	564.70
32B	10/23	1357	7.90	564.63
33B	10/23	1450	8.35	564.68

continued------

APPENDIX B (Continued)

Well Number	Date (1980)	Time	Depth to Water[1]	Water Level Elevation[2]
34B	10/23	1442	8.40	564.80
36B	10/23	1455	8.75	564.93
37B	10/23	1510	7.75	564.67
38B	10/23	1535	8.30	564.18
39B	10/23	1530	8.90	564.16
40B	10/23	1130	8.10	564.68
41B	10/23	1205	7.75	564.65
42B	10/23	1320	7.40	567.41
43B	10/23	1310	8.20	565.37
44B	10/22	1900	10.10	564.11
45B	10/23	1320	6.08	564.67
46B	10/23	1345	12.35	561.04
47B	10/23	1125	7.50	564.25
48B	10/22	1925	9.57	564.20
49B	10/23	1520	9.15	564.34
50B	10/23	1525	9.33	564.20
51B	10/23	1110	7.95	565.38
52B	10/23	0900	9.85	565.23
54B	10/23	1440	5.50	564.58
55B	10/23	0945	8.35	565.22
56B	10/23	1550	10.20	564.51
64B	10/23	0840	6.67	565.52
65B	10/23	0825	6.47	565.23
66B	10/23	1055	9.25	565.02
67B	10/23	1030	9.15	564.82
68B	10/23	1620	8.80	564.99
71B	10/24	1015	13.60	562.08
72B	10/24	1005	11.50	561.93
73B	10/24	0950	12.00	564.94
74B	10/24	0940	13.45	564.98
75B	10/24	0900	12.20	564.93
76B	10/24	0845	13.10	564.78

continued------

APPENDIX B (Continued)

Well Number	Date (1980)	Time	Depth to Water[1]	Water Level Elevation[2]
77B	10/24	1045	13.65	565.03
79B	10/24	1025	13.40	564.37
80B	10/24	1035	11.00	564.86
81B	10/24	0935	13.10	564.98
83B	10/24	0930	13.70	565.00
84B	10/24	0840	13.20	560.83
85B	10/24	0850	11.25	564.95
86B	10/24	1030	11.90	562.23
87B	10/24	0925	12.40	564.90
89B	10/24	1000	13.10	565.01
90B	10/23	1120	8.00	564.76
96B	10/22	1915	9.04	564.33
98B	10/22	1820	3.60	564.17
99B	10/22	1840	11.30	564.42
100B	10/23	1335	9.00	564.68
101B	10/23	1200	7.80	564.62
103B	10/23	1020	9.20	564.62
104B	10/24	0920	11.60	564.95
108B	10/23	0800	6.50	565.41
109B	10/23	1010	5.50	565.22
110B	10/23	1045	8.90	565.09
112B	10/22	1830	1.44	564.14

continued-------

APPENDIX B (Continued)

OVERBURDEN WELLS

Well Number	Date (1980)	Time	Depth to Water[1]	Water Level Elevation[2]
1A	10/23	0810	7.35	564.79
5A	10/22	1850	7.50	565.44
6A	10/23	1540	6.10	565.42
8A	10/23	1410	8.30	564.59
10A	10/23	1140	3.80	565.21
11A	10/23	0905	6.80	565.23
12A	10/23	0825	4.67	567.18
13A	10/22	0830	6.80	564.93
14A	10/23	0815	4.65	567.82
15A	10/22	0845	4.17	568.62
16A	10/23	0855	4.88	567.83
17A	10/23	0915	5.45	566.60
18A	10/23	0927	6.90	566.30
19A	10/23	0933	7.40	565.33
20A	10/23	0957	10.15	563.51
21A	10/23	1035	5.08	569.33
25A	10/23	1150	3.30	570.13
26A	10/23	1145	5.90	564.88
27A	10/23	1315	7.80	564.70
28A	10/23	1400	9.20	563.63
29A	10/23	1420	8.95	563.99
30A	10/23	1430	8.34	564.49
31A	10/23	1700	7.50	564.82
32A	10/23	1355	8.90	563.84
33A	10/23	1450	7.90	565.57
34A	10/23	1440	8.12	565.20
35A	10/23	1505	7.30	564.91
36A	10/23	1515	6.85	566.03
37A	10/23	1510	5.75	567.01
38A	10/23	1535	9.60	563.45
39A	10/23	1530	11.00	563.02

continued-----

APPENDIX B (Continued)

Well Number	Date (1980)	Time	Depth to Water[1]	Water Level Elevation[2]
44A	10/22	1900	8.00	566.24
47A	10/23	1120	7.07	564.48
48A	10/22	1929	5.10	569.04
49A	10/23	1520	9.90	564.09
50A	1-/23	1525	11.30	562.56
51A	10/23	1110	10.10	563.31
52A	10/23	1000	9.07	565.82
55A	10/23	0950	10.00	562.65
56A	10/23	1550	7.00	567.71
66A	10/23	1050	9.30	565.04
67A	10/23	1025	8.65	564.84
68A	10/23	1620	5.35	568.60
71A	10/24	1015	14.80	559.90
72A	10/24	1005	9.45	563.69
73A	10/24	0950	8.30	568.16
74A	10/24	0940	15.60	562.92
75A	10/24	0900	7.70	569.48
76A	10/24	0845	7.45	570.28
77A	10/24	1045	17.30	561.56
78A	10/24	1040	18.10	560.55
79A	10/24	1020	11.60	566.52
80A	10/24	1035	dry	-
81A	10/24	0935	dry	-
82A	10/24	0945	13.90	564.57
83A	10/24	0930	dry	-
84A	10/24	0835	6.30	570.91
85A	10/24	0855	13.15	563.20
86A	10/24	1030	11.80	562.03
87A	10/24	0925	8.40	568.92
88A	10/24	0955	15.50	561.66
89A	10/24	1000	11.40	565.93
90A	10/22	1115	3.10	569.83

continued----

APPENDIX B (Continued)

Well Number	Date (1980)	Time	Depth to Water[1]	Water Level Elevation[2]
96A	10/22	1915	dry	-
102A	10/23	1134	3.70	569.66
103A	10/23	1020	8.30	565.45
104A	10/24	0915	6.10	572.19
108A	10/23	0755	21.05	551.44
109A	10/23	1010	dry	-
110A	10/23	1040	4.40	569.45
111A	10/23	1100	2.35	571.64
112A	10/22	1830	2.49	562.69
113A	10/24	0910	7.05	570.02
114A	10/24	0905	9.60	567.64

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[1] In feet below land surface.

[2] In feet above mean sea level.

APPENDIX C:

SUMMARY OF PURGING AND SAMPLING ACTIVITIES

BEDROCK WELLS

		PURGING BY JRB/SAI		PURGING BY EMPIRE SOILS[2]		DATES SAMPLED[1]	
Well Number	Date Well Completed[1]	Date Purged[1]	Approximate Amount Purged (Gallons)	Date Purged[1]	Approximate Amount Purged (Gallons)	TOC/TOX[3]	All Other Parameters[4]
1B	8/28	9/8	150 to 200	-	-	9/8	9/23 and 9/29
2B	8/29	9/6	do.	-	-	9/8	9/17
3B	9/5	9/11	do.	-	-	9/12	9/23
4B-2	10/3	9/6	do.	10/3	400	9/8	10/13
5B	9/8	9/9	do.	-	-	9/10	9/17
6B	9/5	9/8	NA[5]	-	-	9/10	9/18
7B-2	9/10	9/13	150 to 200	-	-	9/16	9/18
8B	9/8	9/10	do.	-	-	9/12	9/18
9B	9/5	9/9	do.	-	-	9/10	9/17
10B	9/6	9/9	do.	-	-	9/10	9/18
11B	9/25	9/26	do.	9/25	450	9/26	10/8
13B	9/9	9/11	do.	-	-	9/12	9/18
14B	9/12	9/15	do.	-	-	9/16	9/18
15B	9/16	9/19	do.	-	-	9/19	9/22
16B	9/18	9/29	do.	-	-	9/30	10/3
17B	9/12	9/15	do.	-	-	9/16	10/1
18B	9/10	9/12	do.	-	-	9/16	9/24
19B	9/9	9/11	150 to 200	-	-	9/12	9/24
20B	9/27	9/29	do.	9/27	375	9/30	10/3
21B	9/27	9/29	do.	9/27	450	9/30	10/3
25B	9/9	9/11	do.	-	-	9/12	9/18

APPENDIX C: (continued)

Well Number	Date Well Completed[1]	PURGING BY JRB/SAI		PURGING BY EMPIRE SOILS[2]		DATES SAMPLED[1]	
		Date Purged	Approximate Amount Purged (Gallons)	Date Purged	Approximate Amount Purged (Gallons)	TOC/TOX[3]	All Other Parameters[4]
26B	9/8	9/9	do.	-	-	9/10	9/18
28B	9/15	9/19	NA	-	-	9/19	9/24
29B	9/13	9/15	150 to 200	-	-	9/16	9/18
30B	9/22	9/25	NA	9/22	450	9/26	10/1
31B	9/22	9/25	150 to 200	9/22	450	9/26	10/2
32B	9/20	9/25	do.	9/20	450	9/26	10/2
33B	9/22	10/4	do.	9/22	450	10/6	10/8
34B	9/23	9/25	do.	9/23	450	9/26	10/2
35B	9/22	9/25	do.	9/22	450	9/26	10/1
36B	9/22	9/25	do.	9/22	450	9/26 and 9/29	10/2 and 9/29
37B	9/16	9/20	do.	-	-	9/22 and 9/29	9/22
38B	9/20	9/20	do.	9/20	400	9/22 and 9/26	9/22
39B	9/20	9/20	do.	9/20	450	9/20 and 9/26	9/22
40B	9/23	10/4	150	9/23	450	10/6	10/8
41B	9/27	9/29	150 to 200	9/27	450	9/29	10/3
42B	9/16	10/4	do.	-	-	10/6	10/9
43B	9/10	9/12	do.	-	-	9/16	9/24
44B	9/23	9/25	do.	9/23	375	9/26	10/1
45B	9/19	9/25	do.	-	-	9/26	10/1
46B	9/22	9/25	do.	9/22	375	10/6	10/8
47B	9/16	9/19	do.	-	-	9/19	9/24
48B	9/25	9/26	do.	9/25	450	9/26	10/1
49B	9/16	9/20	do.	-	-	9/22 and 9/26	9/22
50B	9/16	9/20	do.	-	-	9/22 and 9/29	9/22
51B	9/24	9/29	do.	9/24	450	9/30	10/8
52B	9/23	9/25	do.	9/23	450	9/26	10/9
54B	9/26	10/4	do.	9/26	450	10/6	10/8
55B	9/27	9/29	do.	9/27	450	9/30	10/3

APPENDIX C: (continued)

Well Number	Date Well Completed[1]	PURGING BY JRB/SAI		PURGING BY EMPIRE SOILS[2]		DATES SAMPLED[1]	
		Date Purged	Approximate Amount Purged (Gallons)	Date Purged	Approximate Amount Purged (Gallons)	TOC/TOX[3]	All Other Parameters[4]
56B	10/6	10/15	150	10/6	450	10/15	10/15
63B	10/11	10/14	25	10/11	450	10/14	10/14
64B	10/11	10/14	25	10/11	450	10/14	10/14
65B	9/27	9/29	25	9/27	400	9/30	10/3
66B	10/3	10/4	25	10/3	450	10/6	10/9
67B	9/29	10/4	25	9/29	450	10/6	10/9
68B	10/1	10/4	25	10/1	450	10/6	10/9
71B	10/4	10/15	150 to 200	10/4	450	10/15	10/15
72B	9/29	10/4	25	9/29	450	10/6	10/16
73B	10/3	10/4	25	10/3	450	10/6	10/9
74B	10/6	10/10	25	10/6	450	10/10	10/12
75B	10/7	10/10	25	10/7	450	10/10	10/13
76B	10/4	10/10	150	10/4	450	10/10	10/13
77B	10/14	10/15	25	10/14	450	10/15	10/15
79B	10/3	10/6	25	10/3	450	10/6	10/13
80B	10/6	10/13	150 to 200	10/6	450	10/13	10/13
81B	10/6	10/10	25	10/6	450	10/10	10/12
83B	10/6	10/10	25	10/6	450	10/10	10/12
84B	10/3	10/10	150	10/3	450	10/10	10/14
85B	10/4	10/10	NA	10/4	450	10/10	10/13
86B	9/29	9.29	25	9/29	450	9/30	10/9
87B	10/7	10/10	25	10/7	450	10/10	10/12
89B	10/6	10/15	150	10/6	450	10/15	10/15
90B	9/29	9/29	25	9/29	450	9/30	10/3
96B	10/11	10/16	25	10/11	450	10/16	10/16
98B	10/17	10/18	25	10/17	400	10/18	10/18
99B	10/15	10/16	25	1-.15	450	10/16	10/16

APPENDIX C: (continued)

		PURGING BY JRB/SAI		PURGING BY EMPIRE SOILS[2]		DATES SAMPLED[1]	
Well Number	Date Well Completed[1]	Date Purged[1]	Approximate Amount Purged (Gallons)	Date Purged[1]	Approximate Amount Purged (Gallons)	TOC/TOX[3]	All Other Parameters[4]
100B	10/13	10/14	25	10/13	450	10/14	10/14
101B	10/15	10/15	25	10/15	450	10/15	10/15
103B	10/14	10/15	25	10/14	450	10/15	10/15
104B	10/11	10/13	25	10/11	450	10/13	10/13
108B	10/16	10/16	25	10/16	450	10/17	10/17
109B	10/15	10/17	25	10/15	450	10/17	10/17
110B	10/15	10/15	25	10/15	450	10/15	10/15
112B	10/15	10/16	25	10/15	450	10/16	10/16
113B	10/17	10/17	25	10/17	450	10/17	DPY-

continued----------

APPENDIX C (Continued)

OVERBURDEN WELLS

Well Number	Date Well Completed[1]	PURGING BY JRB/SAI: Date Purged[1]	PURGING BY JRB/SAI: Approximate Amount Purged (Gallons)	PURGING BY EMPIRE SOILS[2]: Date Purged[1]	PURGING BY EMPIRE SOILS[2]: Approximate Amount Purged (Gallons)	DATES SAMPLED[1]: TOC/TOX[3]	DATES SAMPLED[1]: All Other Parameters[4]
1A	8/28	9/8	P.U.D.[6]	-	-	9/8	9/23
2A	8/29	9/8	do.	-	-	9/16	9/23 & 9/29
3A	9/3	9/11	do.	-	-	9/12	9/23 & 10/13
4A	9/4	9/6	do.	-	-	9/8	-
5A	9/5	9/8	do.	-	-	9/8	9/23
6A	9/4	9/8	do.	-	-	9/10&10/17	9/23
7A	9/3	9/9	do.	-	-	9/10	9/23 & 9/29
8A	9/9	9/10	do.	-	-	9/12	9/23 & 9/29
9A-1	9/3	-	-	-	-	-	-
9A-2	9/5	-	-	-	-	-	-
10A	9/6	9/11	P.U.D.	-	-	9/12	9/23 & 9/29
11A	9/22	9/26	do.	-	-	10/6	10/8
12A	9/5	9/9	do.	-	-	9/10	9/27
13A	9/8	9/15	do.	-	-	9/16	9/23
14A	9/11	9/15	do.	-	-	9/16	9/23 & 9/29
15A	9/16	9/19	do.	-	-	9/19&9/29	9/11 & 9/29
16A	9/17	9/29	do.	-	-	9/30	10/3
17A	9/13	9/15	do.	-	-	9/16	9/24 & 10/1
18A	9/11	9/15	do.	-	-	10/17	10/17
19A	9/9	9/11	do.	-	-	9/12	9/24
20A	9/24	9/29	do.	-	-	9/30	10/3
21A	9/26	9/29	do.	-	-	9/30	10/3
25A	9/9	9/11	do.	-	-	9/12&10/17	9/23
26A	9/8	9/11	do.	-	-	9/12&10/17	9/23
27A	9/11	9/12	do.	-	-	9/16	9/24
28A	9/15	9/19	do.	-	-	9/25	10/1

APPENDIX C (Continued)

Well Number	Date Well Completed[1]	PURGING BY JRB/SAI: Date Purged[1]	PURGING BY JRB/SAI: Approximate Amount Purged (Gallons)	PURGING BY EMPIRE SOILS[2]: Date Purged[1]	PURGING BY EMPIRE SOILS[2]: Approximate Amount Purged (Gallons)	DATES SAMPLED[1]: TOC/TOX[3]	DATES SAMPLED[1]: All Other Parameters[4]
29A	9/13	9/15	P.U.D.[6]	-	-	9/16	9/24 & 10/1
30A	9/19	9/25	do.	-	-	9/26	10/1
31A	9/20	10/4	do.	-	-	10/6	10/8
32A	9/18	9/25	do.	-	-	9/26	10/2
33A	9/20	10/4	do.	-	-	10/6	10/8
34A	9/19	9/25	do.	-	-	9/26	10/2
35A	9/17	9/25	do.	-	-	9/26	10/1
36A	9/19	9/25	do.	-	-	9/26	10/2
37A	9/16	9/20	do.	-	-	9/22&10/17	9/22
38A	9/18	9/20	do.	-	-	9/22&10/17	10/1
39A	9/17	9/20	do.	-	-	9/26	9/22 & 10/1
40A	9/23	10/4	do.	-	-	-	10/8
41A	9/23	9/28	do.	-	-	9/29	10/3
42A	9/16	10/4	do.	-	-	10/6	10/9
43A	9/11	9/15	do.	-	-	9/16	9/24
44A	9/19	9/25	do.	-	-	9/26	10/1
45A	9/19	9/25	do.	-	-	9/26	10/1
46A	9/19	9/25	do.	-	-	10/6	10/8
47A	9/17	9/19	do.	-	-	9/19	9/24
48A	9/23	9/26	do.	-	-	9/26	10/1
49A	9/16	9/20	do.	-	-	9/29	9/22 & 10/1
50A	9/16	9/20	do.	-	-	9/25&10/17	9/22 & 10/1
51A	9/25	9/29	do.	-	-	10/10	10/14
52A	9/22	9/25	do.	-	-	9/26	10/9
54A	9/25	10/4	do.	-	-	10/6	10/8
55A	9/23	9/29	do.	-	-	9/30&10/17	10/3
56A	9/30	10/14	do.	-	-	10/14	10/14
66A	9/30	10/6	do.	-	-	10/6	10/9
67A	9/27	10/4	do.	-	-	10/6	10/9

APPENDIX C (Continued)

Well Number	Date Well Completed[1]	PURGING BY JRB/SAI: Date Purged[1]	PURGING BY JRB/SAI: Approximate Amount Purged (Gallons)	PURGING BY EMPIRE SOILS[2]: Date Purged[1]	PURGING BY EMPIRE SOILS[2]: Approximate Amount Purged (Gallons)	DATES SAMPLED[1]: TOC/TOX[3]	DATES SAMPLED[1]: All Other Parameters[4]
68A	9/25	10/4	P.U.D.	-	-	10/6	10/9
71A	9/30	10/15	do.	-	-	10/15	10/15
72A	9/24	10/6	do.	-	-	10/6	10/16
73A	10/1	10/6	do.	-	-	10/6	10/13 & 10/19
74A	10/3	10/10	do.	-	-	10/16	10/16
75A	10/6	10/10	do.	-	-	10/10	10/13
76A	10/3	10/10	do.	-	-	10/10	10/13
77A	10/9	10/15	do.	-	-	10/16	10/16
78A	10/6	10/10	do.	-	-	10/10	10/16
79A	10/2	10/6	do.	-	-	10/6	10/13
80A	9/30	-	-	-	-	-	-
81A	10/2	-	-	-	-	-	-
82A	10/2	10/10	P.U.D.	-	-	10/10	10/12
83A	10/3	-	-	-	-	-	-
84A	10/1	10/10	P.U.D.	-	-	10/10&10/17	10/14
85A	10/3	10/10	do.	-	-	10/10	10/13
86A	9/23	10/6	do.	-	-	10/6	10/9
87A	10/4	10/10	do.	-	-	10/10	10/12
88A	10/4	10/10	do.	-	-	10/10	10/12
89A	10/2	10/15	do.	-	-	10/15	10/15
90A	9/24	9/29	do.	-	-	9/30	10/3
96A	10/8	-	-	-	-	-	-
99A	10/14	-	-	-	-	-	-
101A	10/10	10/15	P.U.D.	-	-	10/15	10/15
102A	10/6	10/14	do.	-	-	10/14	10/14
103A	10/10	10/15	do.	-	-	10/15	10/15
104A	10/9	10/13	do.	-	-	10/13	10/13
108A	10/15	-	-	-	-	-	-
109A	10/13	-	-	-	-	-	-
110A	10/14	10/15	P.U.D.	-	-	10/15	10/15

APPENDIX C (Continued)

		PURGING BY JRB/SAI		PURGING BY EMPIRE SOILS[2]		DATES SAMPLED[1]	
Well Number	Date Well Completed[1]	Date Purged[1]	Approximate Amount Purged (Gallons)	Date Purged[1]	Approximate Amount Purged (Gallons)	TOC/TOX[3]	All Other Parameters[4]
111A	10/13	10/14	P.U.D.	-	-	10/14	10/14
112A	10/14	10/16	do.	-	-	10/16	10/16
113A	10/16	-	-	-	-	-	-
114A	10/16	-	-	-	-	-	-

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[1] All dates are in 1980.

[2] Empire Soils Investigations, Inc. were the well drillers for the monitoring program.

[3] "TOC/TOX" means total organic carbon and total organic halogens.

[4] "All other parameters" includes volatiles, semi-volatiles, pesticides, metals, TCDD, nitrates, and fluorides.

[5] NA means "data not available."

[6] P.U.D. means "purged until dry."

APPENDIX D

LABORATORY MEASUREMENTS ON GROUND-WATER SAMPLES

BEDROCK WELLS

Well Number	Depth to Water[1]	pH	Specific Conductance (in micromhos)	Total Organic Carbon (in parts per million)	Total Organic Halogens (in parts per billion)
1B	9.0	12.6	2,200	39.2	25.6
2B	5.0	9.7	NA[2]	35.1	22.1
3B	8.5	7.2	699	27.3	51.5
4B	19.5	13.3	18,000	64.5	26.3
5B	9.1	7.3/8.0	6,620/707	39.0/80.3	34.4/38.1
6B	8.0	8.3	1,300	77.0	11.1
7B	8.5	9.7	429	7.8	118.0
8B	8.0	7.3	1,770	23.5	7.5/26.7/11.4
9B	10.3	8.1/7.8	851/1,050	63.8/72.5	18.9/18.4
10B	5.0	7.5	471	23.8	18.8/26.3
11B	16.0	12.0	2,480	2.2	38.2
13B	7.0	7.6	1,110	24.8	23.7
14B	6.0	7.7	399	77.0	19.4
15B	10.0	7.6/8.8	1,920/NA	4.0/1.7	33.7
16B	8.0	7.4	2,670	1.5	1.7
17B	8.0	9.0	690	9.5	11.1
18B	8.0	11.8	3,090	89.0	NA
19B	9.0	7.3	1,020	28.0	41.8
20B	9.5	10.2	NA	2.6	45.4
21B	10.0	12.6	991	6.1	9.9
25B	9.0	5.8	641	25.2	27.3
26B	5.0	7.5/7.7	465/450	50.0/25.2	27.1/21.3/25.1
28B	9.5	12.3	4,920	17.9	19.4
29B	8.5	11.1	910	4.2	41.2
30B	7.5	8.3	274	1.6	46.3
31B	8.0	8.8	278	1.0	38.7
32B	9.0	9.0	356	1.4	23.6
33B	NA	10.0	2,450	3.6	25.1
34B	8.5	11.1	800	4.0	8.7
35B	7.0	11.0	515	2.7	33.0
36B	9.0	10.5	1,002	1.8	23.0
37B	8.0	10.7	1,360	5.2	509.0/488.0
38B	8.4	6.9	688	1.1	147.0
39B	8.5	12.5	4,970	8.0	54.5
40B	1.6	8.8	325	1.6	45.3
41B	8.0	6.9	2,168	1.8	6.4/5.9
42B	9.5	11.4	2,190	6.9	23.3
43B	8.5	11.5	1,980	190.0	5.1
44B	NA	10.3	246	1.6	30.9
45B	9.0	11.6	2,116	2.3	25.7
46B	11.2	12.4	14,100	16.6	9.1
47B	17.5	12.2	4,450	4.9	20.1
48B	9.0	9.2	387	1.8	58.9/57.7

continued---------

APPENDIX D: (Continued)

Well Number	Depth to Water[1]	pH	Specific Conductance (in micromhos)	Total Organic Carbon (in parts per million)	Total Organic Halogens (in parts per billion)
49B	11.0	12.7	5,160	5.6	21.0
50B	9.0	11.6	1,470	7.6	34.1/44.3
51B	8.0	8.1	346	2.1	49.1
52B	NA	9.9	200	1.4	48.0
54B	5.5	7.3	865	2.4	NA
55B	9.0	7.2	1,500	1.4	28.0
56B	10.3	8.3	2,830	2.2	16.4
63B	8.4	11.1	1,930	53.0	16.4/14.5
64B	7.1	12.0	7,520	9.8	13.7
65B	6.5	10.0	2,090	1.3	47.8
66B	9.8	7.4	1,160	1.5	37.3
67B	9.1	9.2	1,860	1.4	22.5
68B	8.8	10.4	349	1.5	36.3
71B	10.3	8.6	678	3.8	52.1
72B	8.3	7.4	3,340	1.7	71.4
73B	11.3	9.5	2,080	1.2	4.8
74B	10.2	8.2	1,050	6.7	10.0
75B	9.2	7.2	1,030	50.0	24.3
76B	10.2	12.3	6,730	5.3	20.2/14.8
77B	11.0	12.2	3,010	4.0	NA
79B	13.1	10.2	1,170	1.5	20.3
80B	8.3	10.4	2,000	3.0	NA
81B	9.4	9.6	1,020	2.6	16.1
83B	9.5	9.2	655	8.0	7.9
84B	9.2	8.3	2,080	11.6	9.7
85B	8.2	7.9	2,130	2.8	6.4/12.6
86B	NA	8.3	1,710	1.4	NA
87B	9.2	8.2	922	12.6	3.9
89B	10.3	11.9	2,210	15.1	35.3
90B	9.0	8.3	1,810	3.1	16.2
96B	11.5	11.4	946	5.2/5.0	28.0
98B	3.5	10.8	386	NA	9.9/7.1
99B	11.5	12.2	4,000	3.8	36.7
100B	9.3	11.9	3,450	2.1	11.2
101B	8.3	7.5	1,410	3.3	40.1
103B	9.4	7.8	1,980	2.4	21.8
104B	8.5	12.2	5,380	4.5	32.2
108B	9.0	9.9	261	1.0	47.2
109B	6.2	10.7	1,058	1.1	50.0/45.4
110B	9.2	11.3	1,099	9.9	36.8/38.1
112B	1.5	1.23	5,330	3.6	NA

continued--------

APPENDIX D: (Continued)

OVERBURDEN WELLS

Well Number	Depth to Water[1]	pH	Specific Conductance (in micromhos)	Total Organic Carbon (in parts per million)	Total Organic Halogens (in parts per billion)
1A	9.0	7.3	1,413	38.3	3.4/15.3
2A	9.3	8.1	1,800	5.5	10.1
3A	6.0	7.2	1,480	26.0	14.5
4A	19.0	8.6	1,300	38.0	7.8
5A	8.0	12.9	NA	45.8	21.3
6A	7.0	9.5	688	68.8	<1/5.5
7A	7.0	8.8	9,590	40.2	3.1/2.9
8A	5.0	6.0	2,120	22.0	NA
10A	10.0	8.1	2,980	26.2	19.1
11A	NA	7.3	1,066	3.9	1.4
12A	5.0	7.3	3,880	25.0	9.1
13A	5.5	9.7	4,020	5.8	3.4
14A	5.0	7.8	2,550	39.0	7.8
15A	12.0	7.7	1,670	9.7/2.0	29.0/31.6
16A	5.0	7.1	1,000	1.6	11.0
17A	7.0	12.1	3,420	31.1	8.2
18A	7.0	8.8	2,470	6.6/6.7	13.0/8.3
19A	10.5	7.8	1,520	33.8	16.3
20A	18.5	7.7	702	7.6	32.5
21A	9.0	9.1	567	2.8	18.3
25A	4.0	6.9	1,090	36.0	127.0/116.0
26A	6.5	7.1	1,310	27.2	12.0/34.0
28A	19.0	7.7	227	4.5	7.4
29A	15.0	7.1	2,520	13.6	25.1
30A	19.0	7.8	1,974	8.0	6.5
31A	NA	8.7	1,270	10.2	4.5
32A	14.0	12.2	4,560	25.0	13.4
33A	NA	8.0	4,090	6.9	28.3
34A	23.0	8.4	2,070	14.0	NA
35A	22.0	8.1	2,250	6.5	9.6
36A	20.0	9.0	951	5.4	14.8
37A	6.0	9.1	1,170	6.4	16.2
38A	10.4	8.3	1,160	5.5	14.3/13.5
39A	22.5	10.6	590	3.5	36.8/27.9/17.0
41A	19.0	7.5	3,890	7.1	10.3/19.7/24.8
42A	12.1	6.8	3,270	6.8	5.4
43A	8.5	8.8	1,025	8.7	10.5
44A	NA	9.9	660	3.5	3.9
45A	6.5	12.2	3,740	10.4	19.4/23.3
46A	13.4	8.6	2,080	7.2	5.6
47A	12.5	12.5	7,820	2.0	5.3
48A	14.0	7.7	857	12.0	10.9
49A	17.0	8.5	770	3.6/2.2	19.3/18.9
50A	11.1	10.2	590	3.7/3.9	664.0/730.0

continued-----

APPENDIX D: (Continued)

Well Number	Depth to Water[1]	pH	Specific Conductance (in micromhos)	Total Organic Carbon (in parts per million)	Total Organic Halogens (in parts per billion)
51A	11.8	7.0	2,760	9.8	5.6
52A	NA	8.8	812	4.3	10.0
54A	6.1	7.2	1,930	4.1	2.0/5.6
55A	20.0	7.7	1,270	9.3	205.0/224.0
56A	9.0	9.2	836	14.5	56.2/50.6
66A	NA	7.4	661	6.8	16.5/26.3
67A	8.5	9.9	382	5.3	59.7
68A	5.6	7.7	865	3.8	1.5
71A	13.6	8.4	831	10.8	19.1
72A	7.5	8.7	1,100	5.8	26.4
73A	16.2	7.5	1,080	5.4	200.0
74A	14.5	7.4	2,150	4.8	12.3
75A	5.0	8.7	256	7.3	18.7
76A	4.5	8.4	571	13.5	178.0
77A	15.6	6.3	2,880	NA	23,000/23,400/23,000
78A	19.7	7.9	1.013	NA	16.3
79A	25.6	8.0	946	6.9	5.4
82A	19.5	11.1	1,410	1.7	24.7
84A	5.2	8.0/7.4	949/1,640	16.6/6.5	167.0/181.0/257.0
85A	12.3	9.6	361	2.5	33.7
86A	14.8	7.3	889	21.8	76.4/74.5
87A	12.4	10.7	640	2.0	33.3
88A	20.0	10.3	1,560	1.7	18.0
89A	9.3	7.8	903	6.2	13.4
90A	21.5	7.0	1,990	13.0	NA
101A	23.6	7.8	2,350	10.1	15.8
102A	3.2	6.7	1,750	12.0	3.6
103A	10.0	8.4	1,240	15.0	17.9
104A	2.3	7.3	2,460	2.6	2,610.0/2,730.0
110A	4.7	7.6/NA	971/923	12.9	27.1
111A	7.0	7.3	1,400	9.8	17.9
112A	2.8	6.7	745	8.5	16.3

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[1] Depth to water in the well was recorded at the time of sampling, in feet below land surface.

[2] Not available.

THE GROUND-WATER MONITORING PROGRAM AT LOVE CANAL:

Volume II. Well Logs and Diagrams

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Bedford, Massachusetts 01730

EPA Contract 68-02-3168

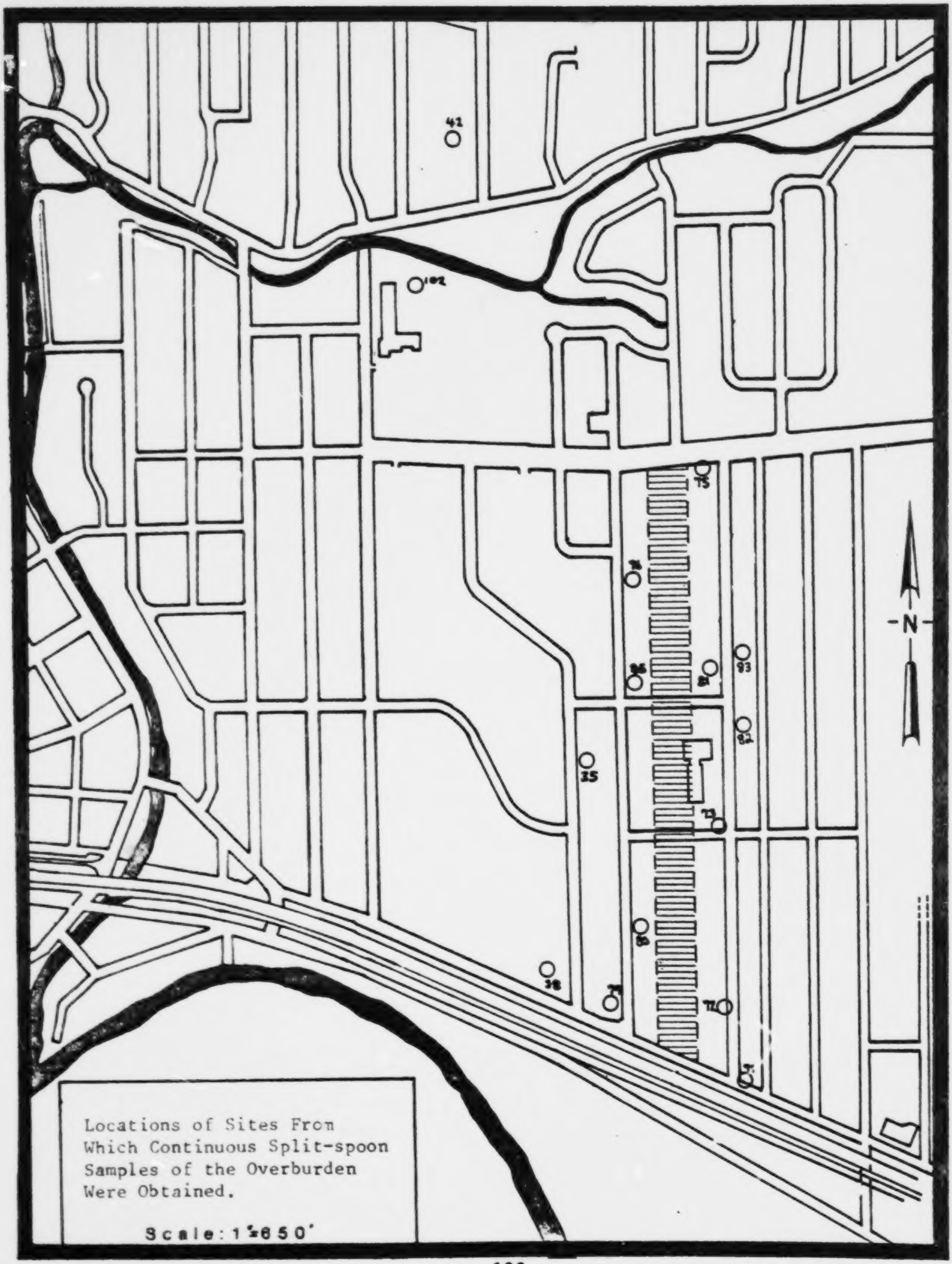
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

APPENDIX E: Split-spoon Sample Descriptions

Continuous split-spoon samples were taken at 15 sites in order to obtain detailed geologic information on the overburden in the study area. The 15 sites are:

- 35
- 38
- 42
- 71
- 72
- 73
- 75
- 76
- 79
- 80
- 81
- 82
- 83
- 85
- 102

The locations of these sites are shown in Figure E-1. Detailed descriptions of these samples follow.



Locations of Sites From Which Continuous Split-spoon Samples of the Overburden Were Obtained.

Scale: 1"=650'

WELL 35-A
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
TOP 4' NOT SAMPLED		
GRAYISH BROWN, 10 YR 5/2, CLAY (CLAY) MOIST, FIRM,	1.5	4 - 5.5
SLIGHTLY PLASTIC.		
BROWN, 7.5 YR 5/2, SILT LOAM (SANDY SILT), MOIST, FIRM,	0.5	5.5 - 6
MUCH ROUNDED GRAVEL		
BROWN TO DARK BROWN, 10YR 4/3 AND PALE BROWN, 10 YR 6/3,	3.5	6 - 9.5
CLAY (CLAY), MOIST, FIRM, PLASTIC, VARVED		
DARK GRAY, 10 YR 4/1, SILTY CLAY, (SILTY CLAY/CLAYEY SILT),	3.5	9.5 - 13
MOIST, SOMEWHAT FIRM, PLASTIC		
DARK GRAY, 10 YR 4/1, CLAY (CLAY), WET, VERY PLASTIC,	12	13 - 24
VERY STICKY		

Textural descriptions are USDA: Those in parenthesis,sediment descriptions after Shepard, 1943.

WELL 38 - A
OVE RDEN DESCRIPTION FROM
CONTINUOUS SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
OLIVE GRAY, 5 Y 5/2, AND DARK GRAYISH BROWN, 2.5 Y 4/2,	1.5	0 - 1.5
CLAY (CLAY), FIRM, MOIST, SLIGHTLY PLASTIC		
LIGHT OLIVE BROWN, 2.5 Y 5/4, LOAMY FINE SAND (SAND), MOIST	0.5	1.5 - 2
LOOSE, FRIABLE		
DARK GRAYISH BROWN, 2.5 Y 4/2, CLAY (CLAY), MOIST, FIRM,	0.5	2 - 2.5
SLIGHTLY PLASTIC		
LIGHT OLIVE BROWN, 2.5 Y 5/4, LOAMY FINE SAND (SAND), MOIST	1.3	2.5 - 3.8
LOOSE, FRIABLE		
BROWN, 7.5 YR 5/4, MOTTLED WITH GRAY, 10 YR 6/1, CLAY TO	12.2	3.8 - 16
SILTY CLAY (SILTY CLAY), MOIST, FIRM, PLASTIC		
GRAYISH BROWN, 10 YR 5/2, CLAY TO SILTY CLAY (SILTY CLAY),	8.2	16 - 24.2
VERY MOIST, VERY PLASTIC		
GRAYISH BROWN, 10 YR 5/2, CLAY TO SILTY CLAY (SILTY CLAY),	3.8	24.2 - 28
WET, VERY PLASTIC, COMMON ROUNDED GRAVEL, FEW ROUNDED COBBLES		

TEXTURAL DESCRIPTIONS ARE USDA: THOSE IN PARENTHESIS ARE SEDIMENT DESCRIPTIONS AFTER SHEPARD, 1943.

Well 42-c

Overburden

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Dark yellowish brown, 10yr3/4, silty clay, fill	2'	0-2'
Grayish brown, 10yr5/2, and light yellowish brown, 10yr6/4 silty clay and clay loam mixed fill	2'	2'-4'
Brown (7.5yr5/4) and pinkish gray (7.5yr6/2) clay, somewhat moist, firm	2'	4'-6'
Dark grayish brown 10yr4/2 mottled, clay,firm, grayish brown, 10yr5/2, clay	10'	6'-16'
Glacial till: Dark grayish brown, (10yr4/2) clay and silty clay, much rounded and subrounded gravel of dolomite and other minerals	8'	16'-24'

WELL 71-B
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Very dark grayish brown, 2.5y3/2, clay loam, (sand, silt, clay), slightly moist, somewhat firm	.8	0-.8
Light olive brown, 2.5y5/4, and brownish yellow, 10yr6/6, clay, (clay), dry, very firm to hard, very mottled	2.0	.8-2.8
Yellowish brown, 10yr5/8, and pinkish brown, 10yr6/3, loamy sand, (sand), moist, loose, friable, few firm pockets of sandy clay (clayey sand)	3.4	2.8-6.2
Reddish brown, 5yr4/4, grayish brown, 10yr5/2, and very dark brown, 10yr7/3, clay, (clay), moist, firm, very mottled, very varved	3.7	6.2-9.9
Dark gray, 5yr4/1, clay, (clay), moist, slightly plastic, slightly sticky	3.4	9/9-13.3
Reddish gray, 5yr5/2, clay to silty clay, (silty clay), very moist, very plastic, sticky	9.6	13.3-22.9
Reddish brown, 5yr4/3, silty clay, (clayey silt), very moist to wet, very plastic, very sticky, very gravelly, cobbly	2.1	22.9-25.0
Reddish brown, 5yr4/4, silty clay, (clayey silt), moist, very firm, very gravelly, cobbly	5.0	25.0-30.0

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 72 - C
OVERBURDEN DESCRIPTION FROM
CONTINUOUS SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
DARK BROWN, 10 YR 3/3, SILTY CLAY, (SLITY CLAY/CLAYEY SILT), MOIST, FIRM, COBBLY	2.1	0 - 2.1
REDDISH BROWN, 2.5 Y 5/4, LOAMY FINE SAND, (SAND), MOIST SOMEWHAT FIRM	0.5	2.1-2.8
DARK BROWN TO BROWN, 10 YR 4/3, FINE SANDY LOAM, (SILTY SAND), MOIST, SOMEWHAT PLASTIC.	0.2	2.8-3.0
YELLOWISH BROWN, 10 YR 5/4 CLAY, (CLAY) SLIGHTLY MOIST, VERY FIRM, SOMEWHAT PLASTIC	0.9	3.0-3.9
BROWN, 7.5 YR 5/4, SILTY CLAY, (SILTY CLAY/CLAYEY SILT), SLIGHTLY MOIST, VERY FIRM, VERY MOTTLED	4.5	3.9-8.4
DARK BROWN, 7.5 YR 4/4, SANDY CLAY (CLAYEY SAND), VERY MOIST, PLASTIC	0.1	8.4-8.5
DARK BROWN TO BROWN, 10 YR 4/3, SILTY CLAY LOAM, (CLAYEY SILT), SLIGHTLY MOIST, VERY FIRM, MOTTLED	0.5	8.5-9.0
DARK BORWN, 7.5 YR 4/2, SILTY CLAY LOAM, (CLAYEY SILT), MOIST, FIRM, MOTTLED	0.8	9.0-9.8

TEXTURAL DESCRIPTIONS ARE USDA: THOSE IN PARENTHESIS ARE SEDIMENT DESCRIPTIONS AFTER SHEPARD, 1943.

WELL 72 - C
OVERBURDEN DESCRIPTION
CONTINUED

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
REDDISH BROWN, 5 YR 5/3 AND 5 YR 4/4, SILTY CLAY, (SILTY	5.7	9.8-15.5
CLAY/CLAYEY SILT), VERY MOIST, PLASTIC, SOMEWHAT STICKY		
REDDISH BROWN, 5 YR 4/4, SANDY CLAY, (CLAYEY SAND), WET,	13.8	15.5-29.3
PLASTIC, SOMEWHAT STICKY, VERY GRAVELLY, COBBLY		
DARK GRAYISH BROWN, 10 YR 4/2, SILTY CLAY, (SILTY CLAY/	0.6	29.3-29.9
CLAYEY SILT), MOSIT, FIRM		
REDDISH BROWN, 5 YR 5/3, SILTY CLAY, (SILTY CLAY/CLAYEY SILT),	5.6	29.9-35.5
MOIST, FIRM		

TEXTURAL DESCRIPTIONS ARE USDA: THOSE IN PARENTHESIS ARE SEDIMENT DESCRIPTIONS AFTER SHEPARD, 1943.

WELL 73-B
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Dark grayish brown, 10yr4/2, dark yellowish brown, 10yr4/6, and gray, 10yr5/1, clay loam, slightly moist, very firm, very mottled	2.4	0-2.4
Light olive brown, 2.5y5/6, loamy sand, (sand), moist, loose friable, common pale mottles	.6	2.4-3.0
Light olive brown, 2.5y5/4, and light gray, 2.5y7/1, sandy clay, (clayey sand), slightly moist, firm, mottled	.8	3.0-3.8
Reddish brown, 5yr5/3, yellowish brown, 10yr5/6, and light gray, 10yr7/2, clay to silty clay, (silty clay), slightly moist, very firm, very mottled	10.3	3.8-14.1
Dark grayish brown, 7.5yr4/2, and reddish gray 5yr5/2, clay, moist, very plastic, sticky	10	14.1-24.1
Reddish brown, 5yr5/3, clay to silty clay, (silty clay), very moist to wet, very plastic, very sticky, very gravelly, cobbly	1.4	24.1-25.5
Reddish brown, 2.5yr4/4, silty clay, (silty clay), moist, very firm, very gravelly, cobbly	.5	25.5-26.0

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 75-B
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Not sampled	5.0'	0-5.0'
Dark brown, 10yr3/3, silty clay, (clayey silt), slightly	4.6'	5.0'-9.6'
moist, firm, somewhat plastic		
Reddish brown, 5yr4/3 and brown, 7.5yr5/4, clay, (clay),	1.2'	9.6'-10.8'
moist, plastic, gravelly, mottled		
Reddish brown, 7.5yr5/4 and grayish brown, 10yr5/2, clay,	2.1'	10.8'-12.9'
(clay) moist, plastic, few black bands		
Black, N2/0, tar-like substance	0.2'	12.9'-13.1'
Brown, 7.5yr5/4, and reddish brown, 5yr5/3, clay, (clay),	2.8'	13.1'-15.9'
moist, plastic, sticky		
Reddish brown, 7.5yr5/4, silty clay, (clayey silt), moist,	1.1'	15.9'-17.0'
plastic, slightly sticky, gravelly		

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 76-B
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Very dark grayish red, 10yr3/2, clay loam, (sand, silt, clay)	1.5	0-1.5
slightly moist, firm, few fine roots		
Very dark yellowish brown, sandy clay, (clayey sand), moist,	.4	1.5-1.9
firm, slightly plastic		
Very dark grayish red, 10yr3/2, and multicolored, mixed fill	6.5	1.9-8.4
sandy clay, and silty clay, (sand, silt, clay), moist to		
very moist, gravel, metal, broken glass		
Dark grayish brown, 10yr4/2, and reddish brown, 5yr4/3, clay	3.5	8.4-11.9
(clay), slightly moist, firm, mottled		
Brown to dark brown, 7.5yr4/2, clay to silty clay, (silty	1.7	11.9-13.6
clay, very moist, very plastic, very sticky		
Brown to dark brown, 7.5yr4/2, silty clay, (silty clay, wet,	9.2	13.6-22.8
very plastic, very sticky		
Reddish brown, 5yr4/4, sandy clay loam, (clayey sand), very	.7	22.8-23.5
wet, plastic, very gravelly, cobbly		
Reddish brown, 5yr4/4, sandy clay, (clayey sand), moist	.5	23.5-24
very firm, gravelly		

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 79-B page 1
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Top 4' not sampled	4	0-4
Yellow, 2.5y7/6 and very dark grayish brown, 10yr3/2, clay	.35	4-4.35
loam (sand, silt, clay), slightly moist, very firm, mottled		
Yellow, 2.5y7/6 and grayish brown, 2.5y5/2, silty clay	.45	4.35-4.8
(silty clay), dry, hard, very mottled		
Olive yellow, 2.5y6/6 and pale brown, 10yr6/3, loamy fine	1.4	4.8-6.2
sand, (sand), moist, friable, very mottled		
Pinkish gray 7.5yr7/2, and reddish gray, 5yr5/2, silty clay,	2.0	6.2-8.2
(silty clay), slightly moist, firm, very varved		
Grayish brown, 10yr5/2, and dark grayish brown, 10yr4/2,	3.8	8.3-12.1
clay to silty clay (silty clay), moist, firm, varved, very		
mottled		
Brown, 10yr5/3, fine sandy loam (silty sand) moist, friable	.1	12.1-12.2
Dark gray, 10yr4/1, clay (clay) moist, very plastic, very	8.1	12.2-20.3
sticky		
Brown, 7.5yr5/2, clay, (clay), very moist, very plastic,	.6	20.3-20.9
very sticky, fine gravelly		

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 79-B page 2
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Reddish brown, 5yr4/3, and red, 2.5yr4/6, clay to silty clay (silty clay), very moist, very plastic, very sticky, very mottled	3.4	20.9-24.3
Reddish brown, 5yr4/3, and red 2.5yr4/6, clay to silty clay (silty clay), wet, plastic, sticky, very gravelly	1.3	24.3-25.6
Reddish brown, 5yr5/3, sandy clay, (clayey sand), moist, firm, very gravelly, very cobbly	3.3	25.6-28.8
Dark gray Dolomite cobble	.2	28.8-29.0
Reddish brown, 5yr5/4, clay to clay loam, (sand, silt, clay) slightly moist, very firm, very gravelly	3.0	29.0-32.0

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 80-B
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Yellowish brown, 10yr5/6, loam, (sand, silt, clay), slightly moist, firm, common fine roots	.6	0-.6
Dark grayish brown, 10yr4/2, and grayish brown, 2.5y5/2, sandy clay, (clayey sand), slightly moist, very firm, very mottled	3.6	.6-4.2
Grayish brown, 10yr5/2, and yellowish brown, 10yr5/6, silty clay, (silty clay), slightly moist, very firm, slightly plastic, very mottled	3.8	4.2-8.0
Not recovered	5	8-13
Grayish brown, 10yr5/2, and reddish brown, 5yr5/4, silty clay, (silty clay), very moist, very plastic, very sticky	4	13-17
Reddish brown, 5yr5/3, sandy clay, (clayey sand), moist, plastic, sticky, very gravelly, cobbly	9.1	17-26.1
Reddish brown, 5yr4/3, sandy clay, (clayey sand), slightly moist, very firm, very gravelly, very cobbly	6.9	26.1-33
Reddish brown, 5yr5/3, sandy clay, (clayey sand), very moist to wet, firm, very gravelly, very cobbly	3.8	33-36.8

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 81-B
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Yellowish brown, 10yr5/4, sandy clay loam, (clayey sand), slightly moist, very firm, many fine roots	1.5	0-1.5
Brown, 10yr5/3, and very dark gray, 7.5yr3/0, sandy clay, (clayey sand/sandy clay), slightly moist, firm, very varved, very mottled	0.8	1.5-2.3
Black, 7.5yr2/0, and dark grayish brown, sandy clay loam, (clayey sand), slightly moist, firm, very mottled	1.7	2.3-4.0
Yellowish brown, 10yr5/6, clay loam, (sand, silt, clay), slightly moist, firm	0.5	4.0-4.5
Dark grayish brown, 2.5y4/2, sandy clay loam (clayey sand), moist, slightly firm, gravelly	1.5	4.5-6.0
Brown to dark brown, 10yr4/2 and gray, 5y6/1, sandy clay, (clayey sand/sandy clay), slightly moist, somewhat firm, slightly plastic, very mottled	5.3	6-11.3
Reddish-brown 5yr5/4, and brown 7.5yr5/2 clay to silty clay, (silty clay) very moist, veryplastic, very sticky, very mottled	16.7	11.3-28.0
Light reddish-brown, 5yr6/3, clay to silty clay, (silty clay), wet, very plastic, sticky, very gravelly, cobbly	2.8	28-30.8

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 82-A page 1
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Not sampled	2.0'	0-2.0'
Very dark grayish brown, 10yr3/2, silt loam, (sandy silt),	0-6.0'	2.0'-2.6'
moist, plastic. Few roots, high organic matter		
Brownish yellow, 10yr6/6, fine sandy clay loam, (sand, silt,	1.6'	2.6'-4.2'
clay), very moist, plastic, gradual boundary		
Brown to olive brown, 10yr4/3, loamy sand, (sand), very	0.9'	4.2'-5.1'
moist, friable to firm		
Reddish brown, 5yr5/4 and gray to light gray N6/2, silty	2.0'	5.1'-7.1'
clay, (silty clay), with clay pockets, moist, plastic,		
sticky, mottled		
Brown, 10yr5/3, light reddish brown, 5yr6/4, light gray,	3.1'	7.1'-10.2'
10yr7/2, and gray 10yr5/1, clay, (clay), slightly moist,		
firm to hard, very mottled		
Dark gray, (10yr4/1), clay, (clay), slightly moist,	1.2'	10.2'-11.4'
slightly plastic		
Dark grayish brown, 10yr4/2 clay, (clay), moist, plastic	18.4'	11.4'-29.8'
few light gray, 10yr7/2, mottles		

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 82-A page 2
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Reddish brown, 5yr4/3, sandy clay loam, (clayey sand), very	0.2'	29.8'-30.0'
moist to wet, plastic, very gravelly, cobbly		

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 83-B
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Dark grayish brown, 2.5y4/2, loam, (sand, silt, clay),	.8	0-.8
slightly moist, firm, common fine roots		
Light gray, 2.5y7/2, light grayish brown, 7.5y6/2, and	3.6	.8-4.4
yellow, 2.5y7/6, sandy clay, (clayey sand), slightly moist,		
firm, very mottled		
Brown, 7.5yr5/4, and dark brown, 10yr4/3, silty clay, (silty	3.2	4.4-7.6
clay), slightly moist, very firm, very mottled		
Gray, 10yr5/1, silty clay, (silty clay), moist, very	4.41	7.6-12.0
plastic, sticky		
Brown, 7.5yr5/2, silty clay to clay, (silty clay), very	2.3	12.0-14.3
moist, very plastic, very sticky		
Reddish gray, 5yr5/2, silty clay, (silty clay), wet, very	10.5	14.3-24.8
plastic, very sticky		
Brown, 7.5yr5/2, silty clay, (silty clay), wet, very	5.3	24.8-30.1
plastic, very sticky, very gravelly		
Light gray to gray, N6/0, sandy clay, (clayey sand), wet,	.4	30.1-30.5
very firm, very gravelly, cobbly		

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 85-B page 1
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Pinkish yellow, 2.5y7/4, and light gray, 2.5y7/1, clay loam, (sand, silt, clay), dry, very firm to hard, very mottled	.9	0-.9
Brownish yellow, 10yr6/8, and very dark brown, 10yr7/3, sandy clay, (clayey sand), slightly moist, loose, friable	.5	.9-1.4
Brown, 10yr5/3, and brownish yellow, 10yr6/6, clay loam, (sand, silt, clay), slightly moist, very firm, very mottled	1.0	1.4-2.4
Light brownish gray, 10yr6/2, and yellowish brown, 10yr5/8, clay, (clay), moist, very firm, very mottled	5.7	2.4-8.1
Grayish brown, 10yr5/2, sandy clay, (clayey sand), wet, plastic, very gravelly	.5	8.1-8.6
Pinkish brown, 10yr6/3, and dark grayish brown, 2.5y4/2, clay to silty clay, (silty clay), moist, very firm, very mottled	1.2	8.6-9.8
Brown, 7.5yr5/4, and gray, 10yr6/1, clay, (clay), moist, slightly plastic, gravelly, very mottled	1.0	9.8-10.8
Dark brownish red, 7.5yr4/2, clay to silty clay, (clay), moist, very plastic, sticky	6.0	10.8-16.8

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 85-B page 2
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Dark grayish brown, 10yr4/2, silty clay, (silty clay), moist	6.1	16.8-22.9
very plastic, very sticky, gravelly		
Dark grayish brown, 10yr4/2, clay, (clay), very moist, very	2.5	22.9-25.4
plastic, very sticky		
Reddish brown, 5yr4/4, sandy clay, (clayey sand), moist,	1.9	25.4-27.3
very firm, very gravelly, cobbly		

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 102-A page 1
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Dark brown, 7.5yr3/4, silt loam, (sandy silt/clayey silt), moist, friable, much organic matter, many roots	.1	0-.1
Dark brown, 10yr3/3, silty clay loam, (clayey silt), moist firm, much organic matter, many roots	.3	.1-.4
Black, N2/0, loamy fine sand, (sand), moist, friable, much organic matter	.1	.4-.5
Light olive brown, 2.5y5/6, silty clay, (silty clay), moist, firm, slightly plastic, very mottled (fine)	.2	.5-.7
Black, N2/0, loamy fine sand (sand), moist, friable, much organic matter	.4	.7-1.1
Very dark gray N3/0, loamy fine sand, (sand), moist, friable, much organic matter	.4	1.1-1.5
Very dark grayish brown, 2.5y3.2, fine sandy loam, moist, firm, much organic matter	3.4	1.5-4.6
Very dark gray, 5y3/1, loamy fine sand, (sand), wet, friable to firm, much organic matter	.3	4.6-4.9
Black, 5y2.5/2, fine sandy clay loam, wet, plastic, much organic matter	.3	4.9-5.2

Textural Descriptions are USDA; Those in parenthesis are sediment descriptions after Shepard, 1943.

WELL 102-A page 2
OVERBURDEN DESCRIPTION FROM
SPLIT-SPOON SAMPLES

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Dark olive gray, 5y3/2, silt loam, (sandy silt), very wet, plastic, much organic matter	.3	5.2-5.5
Dark grayish brown, 2.5y4/2, silty clay loam, (clayey silt), wet, somewhat plastic	.5	5.5-6.0
Very dark gray, N3/0, fine sandy loam, (silty sand), wet, somewhat plastic, much organic matter, few manganese/iron concretons	.7	6.0-6.7
Olive, 5y5/3, silty clay, (silty clay/clayey silt), very moist, plastic, few fine mottles	1.3	6.7-8.0
Brown, 7.5yr5/4, loam, (sand, silt, clay), very wet, very gravelly, common fine roots	.2	8.0-8.2
Very dark grayish brown, 2.5y3/2, silty clay loam, (clayey silt), wet, plastic, somewhat sticky, somewhat gravelly	.2	8.2-8.4
Olive, 5y5/3, light olive brown, 2.5y5/6, and dark grayish brown, 2.5y4/2, clay, (clay), moist, very plastic, non-sticky, very mottled	2.0	8.4-10.4
Brown to dark brown, 10yr4/3, clay, (clay), very moist, very plastic, somewhat sticky, varved	1.6	10.4-12.0

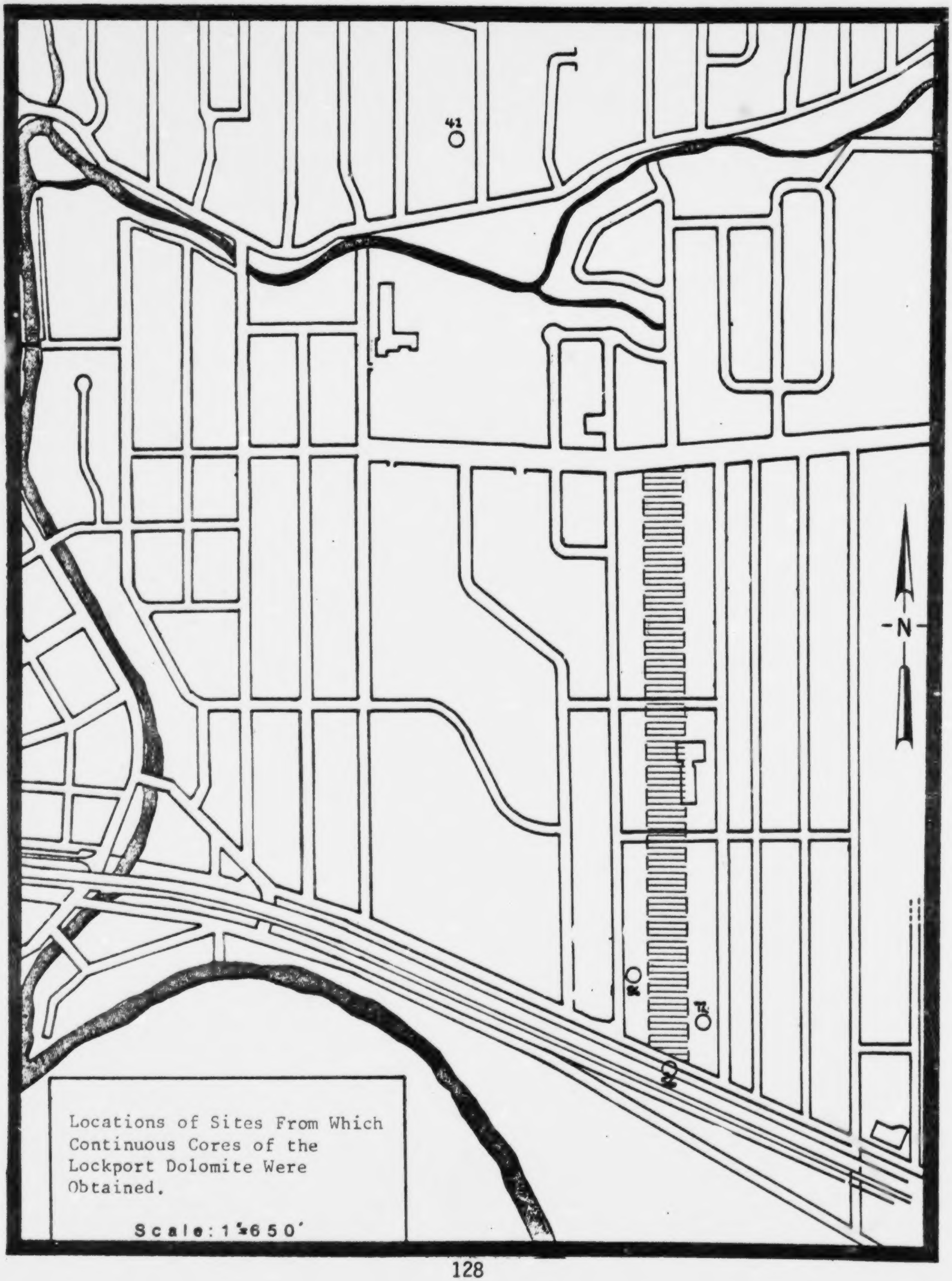
Textural Descriptions are USDA; Those in parenthesis are sediment descriptions *after Shepard, 1943.*

APPENDIX F: Bedrock Core Descriptions

Continuous cores of the Lockport Dolomite were taken at four sites in order to obtain detailed geologic information on the bedrock in the study area. The four sites are:

- 42
- 56
- 72
- 86

The locations of these sites are shown on Figure F-1. Detailed descriptions of these cores follow.



Locations of Sites From Which Continuous Cores of the Lockport Dolomite Were Obtained.

Scale: 1"=650'

Well 42-C
Bedrock

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Dark grey, vuggy Dolomite, with a few partings perpendicular to length of core. Vugs are primarily less than ½mm but range up to 2mm. Partings appear shaley. Larger vugs in layers at 6" and 8" into rock. Vugs are up to 2 cm in diameter with an average diameter of 1mm.	1'	24'-25'.
Highly fractured	.3'	25'-25.3'
Medium grey, massive Dolomite with numerous fossiliferous layers (mostly corals). Fairly vuggy with inter-bedded calcite and some silica. Many larger vugs replaced by calcite.	3'	25.3'-28.3'
Highly fractured	.2'	28.3'-28.5'
Primarily medium grey massive Dolomite with 1 to 2cm thick layers of well defined, dark bedding planes. Some scattered vugs and thin inter-bedded calcite and gypsum.	7.5'	28.5'-36.0'
Medium grey Dolomite - Large number of small fractures and parting's most with calcite.	3'	36.0'-39.0'
Highly fractured	.5'	39.0'-39.5'

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium light grey fine grained Dolomite. Small areas of vertical fracturing, vugs, with calcite layers and partings.	7'	39.5'-46.5'
Medium light to dark grey, fine grained Dolomite, fossiliferous - fairly homogenous. Calcite and abundant pyrite	7.5'	46.5'-54'
Light grey, fine grained Dolomite with occasional fossil and stylolite. Partings contain secondary calcite with some calcite crystals.	4.8'	54'-58.8'
Coarse grained Dolomite, vuggy, pyrite with stylolite, porous permeable zone.	1.2'	58.8'-60.0'
Light to dark grey, highly fossiliferous - secondary mineralization - calcite crystals on partings.	3.5'	60'-63.5'
Same as above except lighter grey.	1.5'	63.5'-65'
Light grey - highly porous - fractural Dolomite.	1.6'	65'-66.6'
Light grey fine grained homogenous crystalline Dolomite.	2.4'	66.6'-69.0'
Medium light grey - fine grained Dolomite. Massive - few partings with some calcite.	5.6'	69.0'-74.6'

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium light grey - coarse grained Dolomite - few partings - Massive.	11.4'	74.6'-86.0'
Medium grey to dark grey fine grained Dolomite - Massive- No partings.	3.2'	86.0'-89.2'
Light to dark grey Dolomite with a large amount of inter-bedded gypsum - Several partings - no calcite.	1'	89.2'-90.2'
Interbedded fine and coarse grained Dolomite with numerous partings - no calcite, some gypsum.	4.4'	90.2'-94.6'
Medium grey fine grained Dolomite - Massive - few partings.	5.4'	94.6'-100'
Medium light grey - fine grained fossiliferous Dolomite Massive - few partings - interbedded gypsum with no calcite.	5.4'	100'-105.4'
Light to dark grey - Massive. Dolomite - Banding of light and dark Dolomite - Dark grey resembles shale? - Few partings - some calcite nodules up to 2 inches.	18.2'	105.4'-123.6'
Medium light grey fine grained Dolomite - Massive - few partings. Very tight - some dark grey bands.	17.9'	123.6'-141.5'

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Light to dark grey fine-grained Dolomite with interbedded gypsum. Some small calcite nodules - numerous partings (≈2 per foot). Several large beds of gypsum - some calcite.	25.5'	141.5'-167'
Medium light grey - coarse grained Dolomite - Massive few partings - numerous calcite nodules.	12.3'	167'-179.3'
Medium light grey - fine grained Dolomite - few interbedded shale beds.	5.8'	179.3'-185.1'
Dark grey - fine grained shale - very tight - no partings.	6.9'	185.1'-192'

WELL 56-C
Bedrock

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium gray, fine grained, cross-bedded Dolomite	1.6'	37.2'-38.8'
Light to medium gray, medium grained Dolomite, a few shaley partings	7.0'	38.8'-45.8'
Light to medium gray, medium to fine grained Dolomite.	3.5'	45.8'-49.3'
Small vugs in upper .5'. Vuggy in lower 1'. Fossil coral		
noted in lower .1'		
Medium grained, mottled, fossiliferous with tabulate corals	1.2'	49.3'-50.5'
Medium grained, medium gray thinly bedded Dolomite. A few	2.0'	50.5'-52.5'
vugs from 1.1'-1.3'		
Mottled gray, vuggy zone. Vugs up to .2' in width	7.4'	52.5'-59.9'
Light gray, medium grained vuggy Dolomite	.7'	59.9'-60.6'
Medium to dark gray, medium grained, vuggy Dolomite	1.6'	60.6'-62.2'
Mottled, medium gray to dark brown, medium grained Dolomite	1.9'	62.2'-64.1'
Calcite vein	.3'	64.1'-64.4'
Mottled, medium gray to dark brown, medium grained Dolomite	.8'	64.4'-65.2'
Medium gray, medium grained Dolomite with a few shale partings	2.8'	65.2'-68.0'

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Light gray, medium to fine grained Dolomite with small vugs	1.0'	68.0'-69.0'
Light gray, medium grained vuggy Dolomite with calcite crystals at 7.1'	11.2'	69.0'-80.2'
Light to dark gray, medium grained vuggy Dolomite. Tabulate coral at 7.7' - "bryozoan ghosts"	8.3'	80.2'-88.5'
Light to dark gray, vuggy, medium grained Dolomite with selimite Gypsum at .9' and from 1.9'-2.6'	5.2'	88.5'-93.7'
Light gray, medium grained Dolomite with small vugs	3.9'	93.7'-97.6'
Mottled white and dark brown medium grained Dolomite with a few shaley partings	2.5'	97.6-100.1
Light gray to mottled, vuggy, medium grained	3.9'	100.1'104.0
Medium to light gray, medium grained Dolomite with shaley partings	1.8'	104.0-105.8
Light gray to light brown, medium to fine grained Dolomite with vugs filled with Gypsum	6.8'	105.8-112.6
Medium gray and medium grained to fine grained, cross-bedded Dolomite	1.7'	112.6-114.3

WELL 56-C

Bedrock page 3

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium gray, medium to fine grained Dolomite with shaley partings and Gypsum filled vugs. One vug from 3.9'-4.0'	12.0'	114.3-126.3
Medium to dark gray, vuggy Dolomite with large vugs filled with calcite. Some algal structures	7.2'	126.3-133.5
Medium to light gray, fine grained Dolomite with shaley partings	4.7'	133.5-138.2
Light to medium gray, medium grained vuggy Dolomite	4.6'	138.2-142.8
Medium gray, fine grained with vugs filled with calcite and shaley partings	12.1'	142.8-154.9
Medium gray, fossiliferous, Dolomite with a few shaley partings	4.9'	154.9-159.8
Light gray, medium to coarse grained Dolomite with small vugs scattered throughout	3.5'	159.8-163.3
Medium to dark brownish gray, medium to coarse grained fossiliferous Dolomite - small vugs scattered throughout	16.8'	163.3-180.1
Medium to brownish gray, fine grained Dolomite, a few shaley partings from 2'-3'	5.8'	180.1-185.9

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium to coarse grained Dolomite, pelmetozoan fragments	.8'	185.9-186.7
Mottled, medium gray to brown, medium grained Dolomite	2.3'	186.7-189.0
with fossil fragments		
Medium to dark gray, fine grained, evenly bedded Dolomite	12.9	189.0-201.9
Brown, very fine grained argillite	.1'	201.9-202.0

WELL 72-C
Bedrock

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium gray fine grained Dolomite - Numerous partings - Interbedded dark thin bands	.8'	35.5'-36.3'
Medium light gray fine grained Dolomite - One parting - Numerous small vugs	.5'	36.3'-36.8'
Medium gray fine grained Dolomite - Numerous partings - Two large voids at 37.2' and at 38.2'	1.8'	36.8'-38.6'
Medium gray fine grained Dolomite with small interbedding of calcite and Gypsum - numerous natural partings, some calcite lined	9.2'	38.6'-47.8'
Medium light gray fine grained Dolomite - several calcite veins inside partings. More weathered texture than previous zone	1.3'	47.8'-49.1'
Medium gray fine grained Dolomite - Numerous partings along interbedded dark bands. Dark bands are sharply angular in dip	3.2'	49.1'-53.3'
Same as above zone only more numerous partings and zones of black bands	9.2'	53.3'-62.5'
Medium grain, massive dolomite	0.1'	62.5'-64.6'

WELL 72-C

Bedrock page 2

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium to light gray, bedded medium grained Dolomite	1.6'	64.6'-66.2'
thickest at .7' - shaley partings at .5' and 1.3' and 1.5'		
Light gray, medium grained Dolomite - Massive	2.9'	66.2'-69.1'
Darker gray Massive Dolomite with small vugs	1.0'	69.1'-70.0'
Medium gray fine grained Dolomite - Massive - no vugs	1.2'	70.1'-71.3'
Dark gray Dolomite with numerous shaley partings	1.5'	71.3'-72.8'
Medium gray fine grained Massive Dolomite	1.4'	72.8'-74.2'
Mottled gray and white, vuggy, medium to coarse grained	6.3'	74.2'-80.5'
Dolomite		
Medium to light gray medium grained Massive Dolomite with	2.4'	80.5'-82.9'
clay intra clasts		
Medium to light gray, vuggy, medium to coarse grained	4.0'	82.9'-86.9'
Dolomite with calcite crystals at 1.2'-1.3'		
Massive - light to medium gray fine grained Dolomite	8.3'	86.9'-95.2'
becoming lighter in color near bottom		

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Light gray medium grained Massive Dolomite with vugs	1.0'	95.2'-96.2'
concentrated in one area from 0 - .2'		
Medium to light gray, medium grained Dolomite with	2.2'	96.2'-98.4'
irregular black shaley partings. Areas of calcite 1.6'-2'		
resembling bryozoan "ghosts"		
Medium to dark gray, medium grained Dolomite with shaley	1.7'	98.4-100.1
partings only in upper .6'		
Medium gray fine grained Dolomite with "bryozoan ghosts"	1.4'	100.1-101.5
Medium gray, medium to large grained (recrystallized)	4.0'	101.5-105.5
Dolomite. Vugs		
Medium gray, fine grained cross-bedded Dolomite, stylolites	3.7'	105.5-109.2
and shaley partings		
Medium gray, medium to fine grained, Massive Dolomite	6.0'	109.2-115.2
"bryozoan ghosts" in lower 1.1'		
Repeat of zone 105.5'-109.2'	3.8'	115.2-119.0
Light gray, fine grained thinly bedded Dolomite	1.2'	119.0-120.2
Light gray, medium grained, vuggy Dolomite	7.2'	120.2-127.4

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium grained, medium to light gray, thinly bedded Dolomite, calcite vein in lower .2'	8.8'	127.4-136.2
Medium to dark gray Dolomite thinly bedded, fine grained Dolomite with shaley partings	13.7'	136.2-149.9
Light gray, fine grained Dolomite with calcite bands	8.1'	149.9-158.0
Light to dark gray, fine grained Dolomite with shaley partings	3.2'	158.0-161.2
Very light gray, fine grained Dolomite with a few vugs in lower .2'	1.1'	161.2-162.3
Light gray and vuggy, medium grained Dolomite with some vugs filled with Gypsum	3.4'	162.3-165.7
Light to dark gray medium grained Dolomite with large vugs filled with Gypsum and/or calcite	5.6'	165.7-171.3
Light to dark gray, fine grained Dolomite with "bryozoan ghosts" from 1.7'-2.4'	5.8'	171.3-177.1
Brecciated zone	1.0'	177.1-178.1
Medium to dark gray, fine grained Dolomite with shaley partings	3.1'	178.1-181.2

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Light gray, medium to coarse grained, fossiliferous with	5.2'	181.2-186.4
crinoid columnals, pelmatozoan fragments		
Medium brownish gray, medium grained Dolomite with small	9.0'	186.4-195.4
vugs scattered randomly throughout		
Medium gray, medium grained highly fossiliferous Dolomite	5.9'	195.4-201.3
Palmatozoan fragments		
Light to medium gray, thinly bedded, medium grained	2.0'	201.3-203.3
Dolomite with vugs scattered throughout becoming darker		
gray near bottom		
Light gray to medium gray, fossiliferous, coarsely grained	1.4'	203.3-204.7
Dolomite - darker gray		
Medium gray, medium to fine grained Massive Dolomite	1.8'	204.7-206.5
Medium gray, fine grained Dolomite with shaley partings.	8.1'	206.5-213.3
Thinly bedded at base		

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium gray fine grained Dolomite - 2 large partings at the top of the section. 1 parting at the base. Some dark gray banding throughout.	1.4'	35.7'-37.1'
Medium gray fine grained fossiliferous (mostly corals) Dolomite. Numerous cavities and vugs - 2 partings.	.4'	37.1'-37.5'
Same as from 35.7'-37.1' except numerous partings throughout section - No dark gray banding.	.9'	37.5'-38.4'
Same as 37.1'-37.5'	.3'	38.4'-38.7'
Medium gray fine grained Dolomite - Numerous vugs and partings - some .1' in length. Some dark gray banding.	4.7'	38.7'-43.4'
Medium gray coarse grained Dolomite - No partings - Massive	.2'	43.4'-43.6'
Medium gray - fine grained Dolomite - numerous partings some lined with Gypsum	7.4'	43.6'-51.0'
Medium light gray fine grained Dolomite - Few Gypsum lined partings some dark banding in lower zone. Coarser grained than above zone.	1.4'	51.0'-52.4'

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium dark gray fine grained Dolomite with interbedded Gypsum prominent in the upper zone - Numerous fractures and partings - some partings lined with Gypsum.	3.9'	52.4'-56.3
Medium dark gray fine grained Dolomite - Massive - Numerous fractures and partings - numerous dark gray to black bands which are bedded angular to the normal horizontal.	4.5'	56.3'-60.8
Light gray medium fine grained Dolomite. Few areas of interbedded Gypsum - Massive - few partings.	2.1'	60.8'-62.9
Light gray coarse grained Dolomite - Massive. Interbedding of medium gray coarse grained Dolomite - few partings.	5'	62.9'-67.9
Medium light gray fine grained Dolomite. Thin interbedding of black material. Numerous partings along thin black beds. Some thin white Gypsum beds present.	1.7'	67.9'-69.6
Light gray coarse grained Dolomite - Massive. Interbedding of medium gray coarse grained Dolomite - no natural partings.	1.6'	69.6'-71.2'
Medium light gray coarse grained fossiliferous Dolomite. Fossils mostly corals. Many small vugs in upper zone. Large calcite, Gypsum and pyrite lined vugs in lower zone.	2.7'	71.2'-73.9

Well 86-C

Bedrock

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Some small Gypsum cavities found in Dolomite matrix.	2.7'	71.2'-73.9' (cont'
Medium light gray Dolomite with some medium dark gray bands - Massive. Fine grained - No partings - Some small nodules of Gypsum	1.1'	73.9'-75'
Medium light gray medium grained Dolomite - Fossiliferous (mostly corals). Many small vugs throughout section - Some large calcite veins and nodules.	2.8'	75'-77.8'
Medium light gray Dolomite with some dark gray bands - No natural partings - Some nodules of Gypsum and calcite.	2'	77.8'-79.8'
Medium light gray to medium dark gray fossiliferous Dolomite. Many partings - Large calcite vein at 90'. Dark banding from 88.6'-90'. Some large vugs associated with calcite vein.	3.7'	79.8'-83.5'
Medium light gray fine grained Dolomite - Massive - few partings - few .1' vugs, few Gypsum nodules.	7.8'	83.5'-91.3'
Light gray Dolomite - no partings - Large amount of interbedding of Gypsum - Numerous vugs lined with some pyrite - Fine grained.	2'	91.3'-93.3'

Well 86-C

CORE LOG Bedrock page 4

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium gray coarse grained Dolomite - Massive - few partings - few Gypsum nodules.	3.1'	93.3'-96.4
Medium gray coarse grained Dolomite - more porous than overlying strata - large amount of interbedded Gypsum. Some Gypsum nodules.	1'	96.4'-97.4
Medium light gray coarse ground Dolomite. No partings. No mineral veins.	6.5'	97.4'-103.9'
Medium light gray medium grained Dolomite - Massive - No partings - some calcite veins - no Gypsum.	7.1'	103.9'-111.0'
Medium light gray coarse grained Dolomite - Massive - No natural partings - some layers or veins of calcite and Gypsum - some nodules of Gypsum.	14.6'	111.0'-125.6'
Medium light gray fine grained Dolomite. Some large .1' Gypsum nodules - numerous partings in lower zone.	10.2'	125.6'-135.8'
Medium gray medium grained Dolomite. Interbedding dark gray bands of fine grained material - few natural partings some .1' Gypsum nodules.	13.1'	135.8'-148.9'

CORE LOG

DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium gray coarse grained fossiliferous Dolomite - Massive - few partings - some small areas with Gypsum nodules (.1' in size). Few interbedded dark bands.	8.5'	148.9'-157.4'
Medium light gray fine grained Dolomite - Several large' .1' vugs lined with calcite and pyrite - Several partings	3.4'	153.4'-160.8'
Light gray coarse grained fossiliferous Dolomite. Numerous partings and mineral lined vugs - some Gypsum nodules.	5.6'	160.8'-166.4'
Dark gray massive Dolomite - fine grained with interbedding of Gypsum dispersed throughout the Dolomite groundmass. Numerous natural partings - some Gypsum nodules.	6.2'	166.4'-172.8'
Medium gray medium grained massive Dolomite. Numerous partings - some Gypsum nodules. Some interbedded dark bands.	10.6'	172.8'-183.4'
Medium gray very coarse grained Dolomite - several partings - few Gypsum nodules	2.6'	183.4'-186.0'
Medium gray coarse grained Dolomite - Massive - few partings. Sharp facies change at 203.8' - no mineral vugs or nodules.	17.8'	186.0'-203.8'

CORE LOG

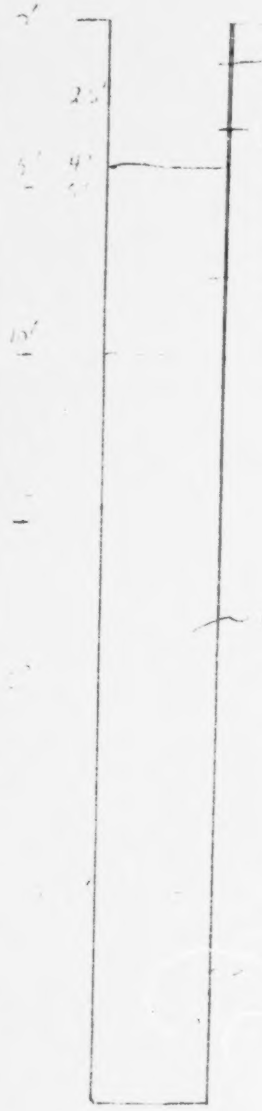
DESCRIPTION	THICKNESS (FEET)	DEPTH (FEET)
Medium light gray fine grained Dolomite - Massive - few	6.6'	203.8'-210.4'
partings - some Gypsum nodules - some interbedded dark		
bands of shale.		
Dark gray very fine ground shale - Massive - no partings.	11.1'	210.4'-221.5'

APPENDIX G: Well Log and As-built Diagrams for the Four Slug-test Wells

WELL LOG

PROFILE

DESCRIPTION



loam, [illegible] brown [illegible]

loam - yellow brown [illegible]

loam, dark brown [illegible]

clay, brown to grey brown [illegible] with [illegible] layers

clay, brown to grey [illegible]

till, stones and pebbles in red silty clay matrix

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. T-1, T-2, T-3, T-4

LOCATION Eastside of basketball court on 92nd St.

	Date	Time
DRILLING STARTED	10/6/80	1546
DRILLING COMPLETED	10/7/80	1520

DRILLER Ed Cole

GEOLOGIST David Robertson

RIG TYPE Acker AD2

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 5 PAGES 93-99

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 4:32.3', 3:26.4', 2:16.4', 1:9.5'

CASING DIAMETER 2"

CASING LENGTH 4:31.8', 3:25.7', 2:15.9', 1:8.4'

SCREEN DIAMETER 2"

SCREEN SETTING 4:32.3'-28.4', 3:26.2'-21.3',*

SCREEN SLOT/TYPE 20 slot-PVC, schedule 40

*2:16.4'-11.5', 1:8.9'-4.0'

PUMP TEST DATA

STATIC DEPTH TO WATER All dry holes

DATE MEASURED 10/7/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

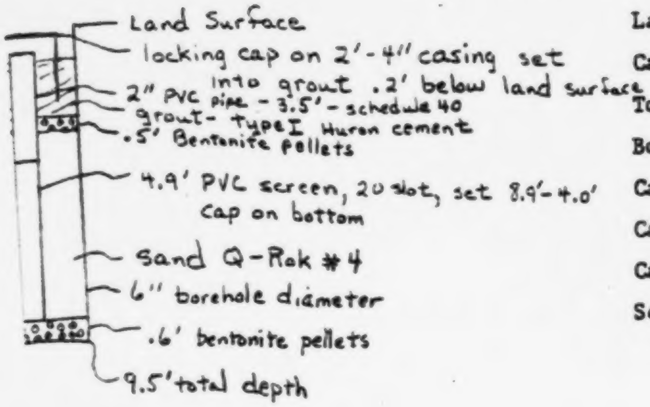
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Finished wells with 4" casing with locking cap set into grout around wells.

AS-BUILT DRAWING


Land Surface
locking cap on 2'-4" casing set into grout .2' below land surface
2" PVC pipe - 3.5' - schedule 40
grout - type I Huron cement
.5' Bentonite pellets
4.9' PVC screen, 20 slot, set 8.9'-4.0' cap on bottom
Sand Q-Rok #4
6" borehole diameter
.6' bentonite pellets
9.5' total depth

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. T-1[illegible]

Project Love Canal

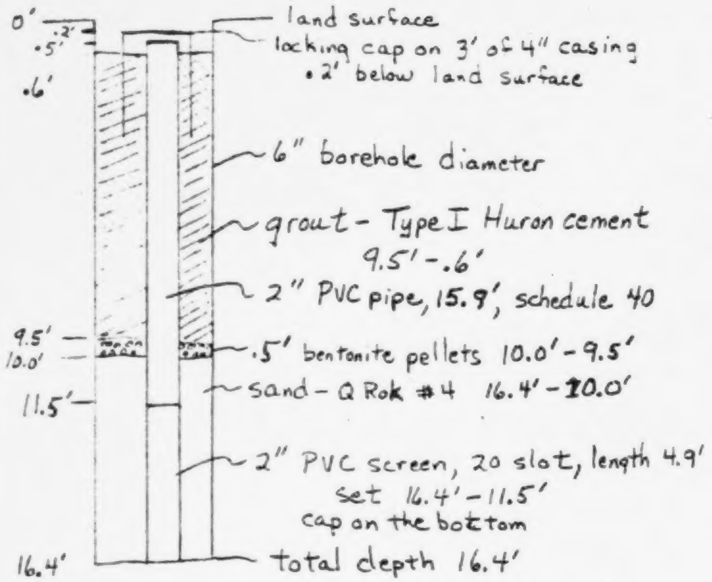
Location Eastside of basketball court on 92nd St.

By: David Robertson

1"=5'

Date 10/7/80

AS-BUILT DRAWING


0'
.2'
.5'
.6'
9.5'
10.0'
11.5'
16.4'
land surface
locking cap on 3' of 4" casing
.2' below land surface
6" borehole diameter
grout - Type I Huron cement
9.5'-.6'
2" PVC pipe, 15.9', schedule 40
.5' bentonite pellets 10.0'-9.5'
sand - Q Rok #4 16.4'-10.0'
2" PVC screen, 20 slot, length 4.9'
set 16.4'-11.5'
cap on the bottom
total depth 16.4'

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker-AD2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. T-2

Project Love Canal

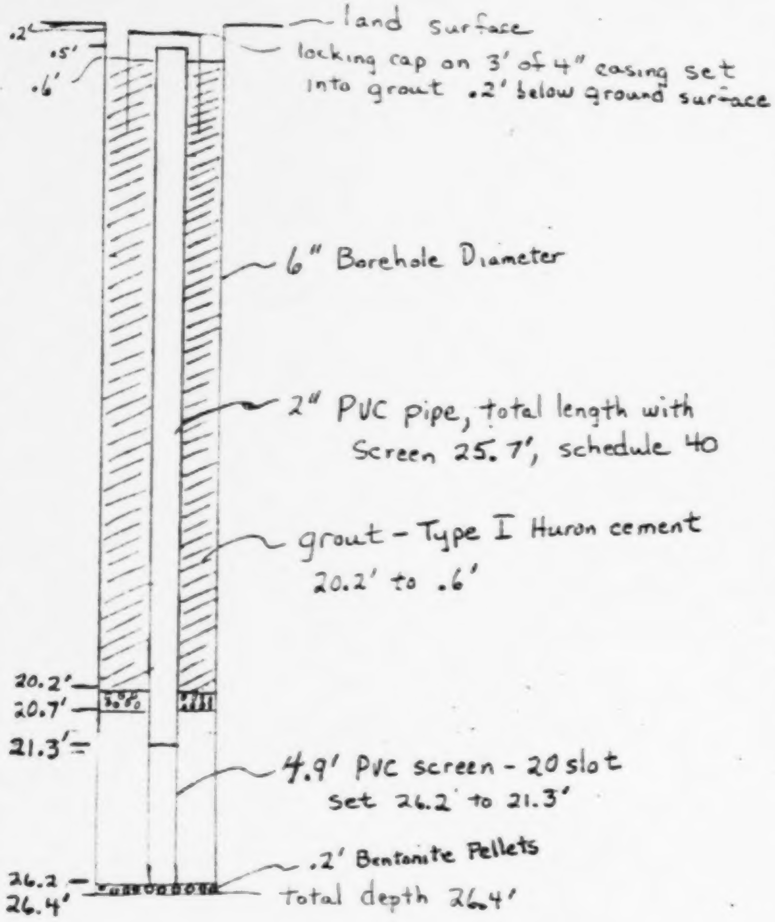
Location Eastside of basketball court on 92nd St.

Date 10/7/80

Prepared By: David Robertson

Scale: 1"=5'

AS-BUILT DRAWING



.2'
.5'
.6'
land surface
locking cap on 3' of 4" casing set into grout .2' below ground surface
6" Borehole Diameter
2" PVC pipe, total length with Screen 25.7', schedule 40
grout - Type I Huron cement 20.2' to .6'
20.2'
20.7'
21.3'
4.9' PVC screen - 20 slot set 26.2' to 21.3'
.2' Bentonite Pellets
26.2
26.4'
total depth 26.4'

CHECKLIST

Land Surface Elevation

Casing Height Above L-S

Total Depth

Borehole Diameter

Casing Diameter

Casing Thickness

Casing Lengths

Screen Data

- **Material**
- **Diameter**
- **Slot Openings**
- **Settings**

Centralizers

Grout Type

Gravel Pack

K-Fittings

Packers

Cement Baskets

Rig Type Acker -AD2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. T-3

Project Love Canal

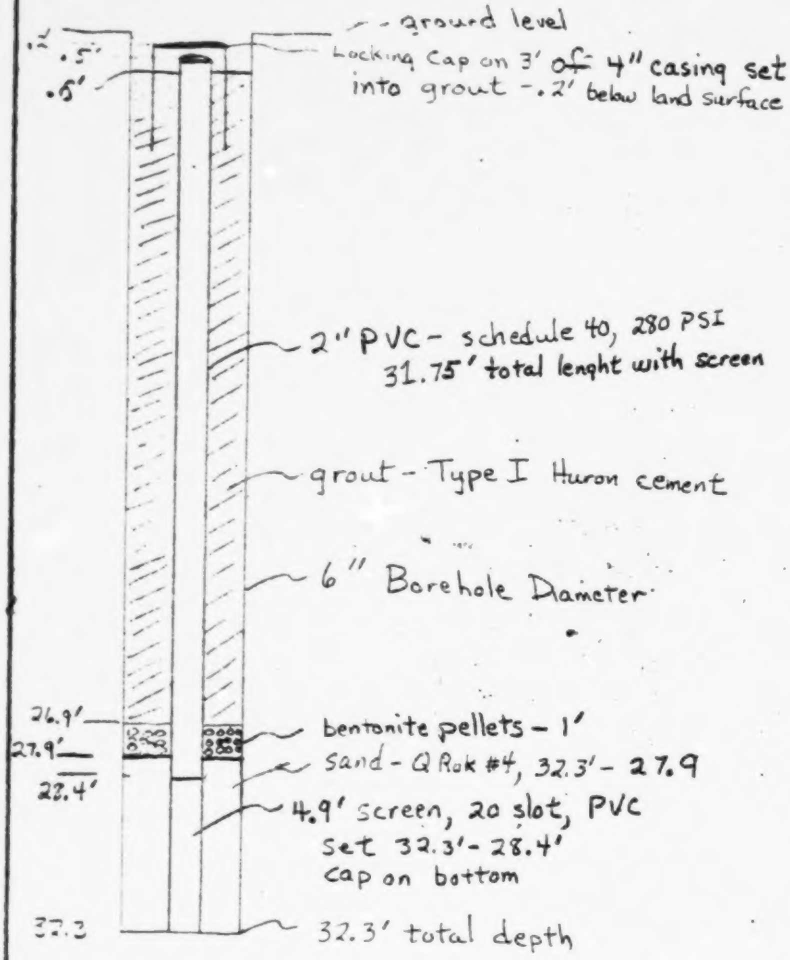
Location Eastside of basketball court on 92nd St.

Prepared By: David Robertson

Scale: 1"=5'

Date 10/7/80

AS-BUILT DRAWING


ground level
.2
.5'
Locking Cap on 3' of 4" casing set into grout -.2' below land surface
.5'
2" PVC - schedule 40, 280 PSI 31.75' total lenght with screen
grout - Type I Huron cement
6" Borehole Diameter
26.9'
27.9'
28.4'
bentonite pellets - 1'
sand - Q Rok #4, 32.3' - 27.9
4.9' screen, 20 slot, PVC set 32.3' - 28.4' cap on bottom
32.3
32.3' total depth

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker-AD2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. T-4

Project Love Canal

Location Eastside of basketball court on 92nd St.

Date 10/7/80

Prepared By: David Robertson

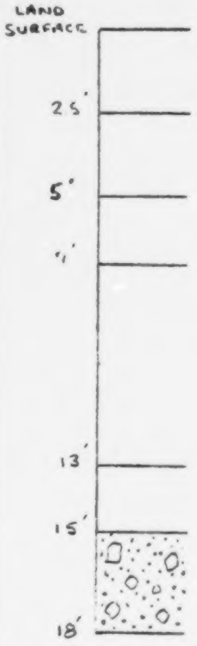
Scale: 1"=5'

APPENDIX H: Well Logs and As-built Diagrams for the Ground-water Monitoring Wells

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN TO GRAY BROWN SILT LOAM, DRY

REDDISH BROWN SILTY CLAY, MOIST

REDDISH BROWN SILTY CLAY, VERY MOIST.

REDDISH BROWN TO BROWN, SILTY CLAY VERY MOIST.

BROWN TO GRAY BROWN, SILTY CLAY, WET.

GLACIAL TILL

SCALE: 1 in = 5 ft

PROJECT Love Canal Study
OWNER State of New York
WELL NO. 1-A
LOCATION Directly across from 10114 Mueller Ct. and due north of 10036 101st St.

	Date	Time
DRILLING STARTED	8/27/80	14:00
DRILLING COMPLETED	8/28/80	14:30

DRILLER Pat Parmentier
GEOLOGIST Dennis Stanczuk
RIG TYPE Mobile - B56
REFERENCE POINT Land surface
R.P. ELEVATION not yet surveyed 572.5
TOPO POSITION flat lying
PROFILE BY Dennis Stanczuk
FIELD BOOK NO. 2 PAGES 1-2

WELL DATA

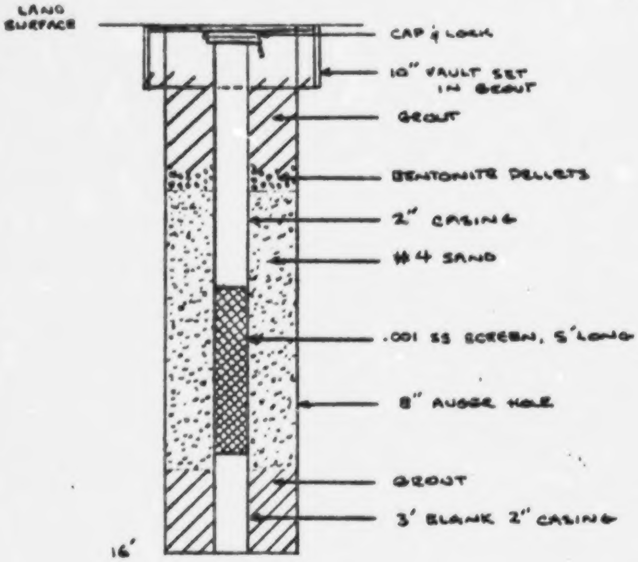
HOLE DIAMETER 6"
HOLE DEPTH 18'
CASING DIAMETER 2" ID
CASING LENGTH 14' after 1' cut off
SCREEN DIAMETER 2"
SCREEN SETTING 15'-10'
SCREEN SLOT/TYPE Johnson 10 slot Stainless .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER 7.35' BTC
DATE MEASURED 12/23/80 at 0810
PUMPING DEPTH TO WATER no pump test yet
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Dennis Stanczuk

Well No. 1-A
Project Love Canal
Location Directly across from 10114 Mueller Ct. & due north of 10036 101st

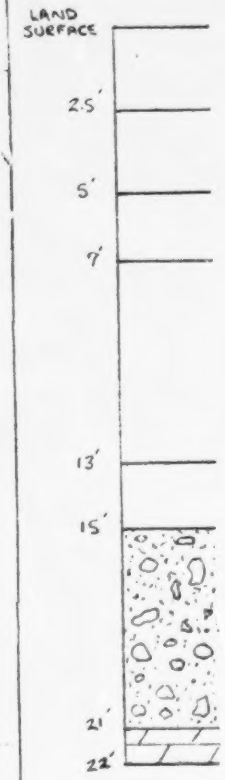
Prepared By: Dennis Stanczuk
Scale: 1"=5'

Date 8/27/80

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN TO GRAY BROWN SILT LOAM, DRY.

REDDISH BROWN SILTY CLAY, MOIST

REDDISH BROWN SILTY CLAY, VERY MOIST

BROWN TO REDDISH BROWN SILTY CLAY VERY MOIST

BROWN TO GRAY BROWN SILTY CLAY WET

GLACIAL TILL

LOCKPORT DOLOMITE

SCALE : 1in = 5ft.

PROJECT Love Canal Study

OWNER State of New York

WELL NO. 1-B

LOCATION Directly across from 10114 Mueller Ct. and due north of 10036 101st St.

	Date	Time
DRILLING STARTED	8/28/80	09:30
DRILLING COMPLETED	8/28/80	11:00

DRILLER Pat Pammentier

GEOLOGIST Dennis Stanczuk

RIG TYPE Mobile B-56

REFERENCE POINT Land Surface

R.P. ELEVATION not yet surveyed 572.5

TOPO POSITION flat lying

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 3

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 22'

CASING DIAMETER 2" ID

CASING LENGTH 20.2'

SCREEN DIAMETER no screen used

SCREEN SETTING no screen used

SCREEN SLOT/TYPE no screen used

Depth to bedrock 21' .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER 6"

DATE MEASURED 8/29/80 - 08:05

PUMPING DEPTH TO WATER no pump test yet

TEST DURATION no pump test yet

PUMPING RATE

TEST DATE

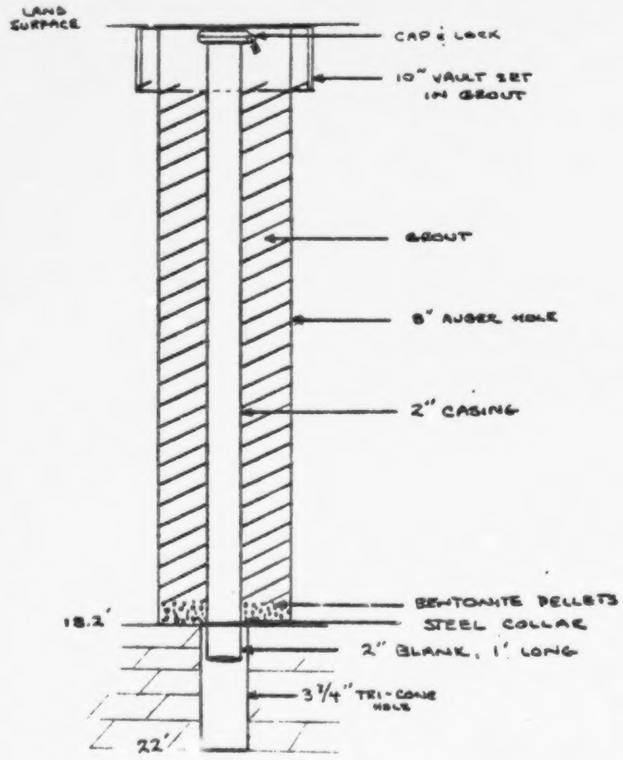
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
    - Material
    - Diameter
    - Slot Openings
    - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Dennis Stanczuk

Well No. 1-B
Project Love Canal
Location Directly across from 10114 Mueller Ct. & due north of 10036 101st
Date 8/27/80

Prepared By: Dennis Stanczuk
Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
LAND SURFACE	DARK GRAY BROWN SILTY CLAY, SOMEWHAT MOIST
4.5'	BROWNISH GRAY CLAY, MOIST
9.5'	BROWNISH GRAY CLAY, VERY MOIST TO WET, STICKY
19'	BROWNISH GRAY CLAY, WET TO VERY WET, VERY STICKY
20.4'	

SCALE : 1 in = 5 ft.

PROJECT Love Canal Study
OWNER John Sepielli
WELL NO. 2-A
LOCATION Northwest corner of BrookhavenDr. and Duero Dr.

	Date	Time
DRILLING STARTED	8/29/80	10:47
DRILLING COMPLETED	8/29/80	13:20

DRILLER Joe Jensen
GEOLOGIST Phil Spooner
RIG TYPE CME-55
REFERENCE POINT Land surface
R.P. ELEVATION not yet surveyed 571.2
TOPO POSITION Level lacustrine plain
PROFILE BY Phil Spooner
FIELD BOOK NO. 4 PAGES 1-3

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 20.4'
CASING DIAMETER 2" ID
CASING LENGTH 20.4'
SCREEN DIAMETER 2" ID
SCREEN SETTING 15.2'- 19.9'
SCREEN SLOT/TYPE .001 - Stainless

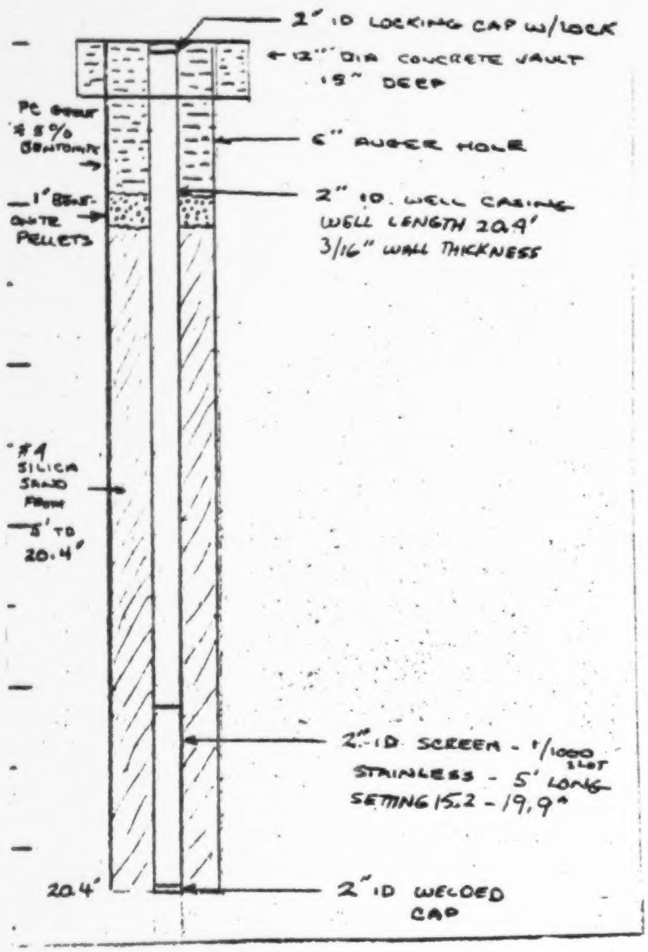
PUMP TEST DATA

STATIC DEPTH TO WATER Hole dry
DATE MEASURED 8/29/80 12:54
PUMPING DEPTH TO WATER Not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Well finished w/locking cap and concrete vault.

AS-BUILT DRAWING


2" ID LOCKING CAP w/LOCK
← 12" DIA CONCRETE VAULT 15" DEEP
PC GROUT & 5% BENTONITE
6" AUGER HOLE
1' BENTONITE PELLETS
2" ID. WELL CASING WELL LENGTH 20.9' 3/16" WALL THICKNESS
#4 SILICA SAND FROM 5' TO 20.4'
2" ID SCREEN - 1/1000 SLOT STAINLESS - 5' LONG SETTING 15.2 - 19.9'
20.4'
2" ID WELDED CAP

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Phil Spooner

Well No. 2-A

Project Love Canal

Location NW corner of Brookhaven & and Duero Dr.

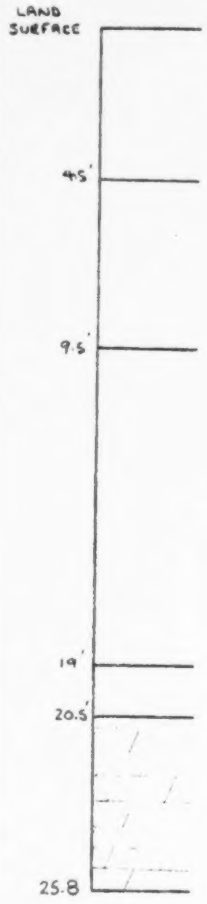
Date 8/29/80

Prepared By: Phil Spooner

Scale: 1"=4'

WELL LOG

PROFILE



DESCRIPTION

DARK GRAY BROWN SILTY CLAY, SOMEWHAT MOIST

BROWNISH GRAY CLAY, MOIST

BROWISH GRAY CLAY, VERY MOIST TO WET, STICKY

BROWNISH GRAY CLAY, WET TO VERY WET, VERY STICKY

LOCKPORT DOLOMITE

SCALE: 1in = 5ft

PROJECT Love Canal Study

OWNER John Sepielli

WELL NO. 2-B

LOCATION Northwest corner of Brookhaven and Duero Dr.

	Date	Time
DRILLING STARTED	8/28/80	12:30
DRILLING COMPLETED	8/29/80	17:00

DRILLER Joe and Leo Jensen

GEOLOGIST Charles Kufs

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 571.2

TOPO POSITION Level lacustrine plain

PROFILE BY Charles Kufs

FIELD BOOK NO. 3 PAGES 2-8

WELL DATA

HOLE DIAMETER 6" (overburden); 3½ (bedrock)

HOLE DEPTH 25.8 feet

CASING DIAMETER 2" to bedrock

CASING LENGTH 24 feet

SCREEN DIAMETER none

SCREEN SETTING none (open hole)

SCREEN SLOT/TYPE none .0001"

DEPTH TO BEDROCK 20.5'

PUMP TEST DATA

STATIC DEPTH TO WATER about 6.5 feet BLS

DATE MEASURED 8/29/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

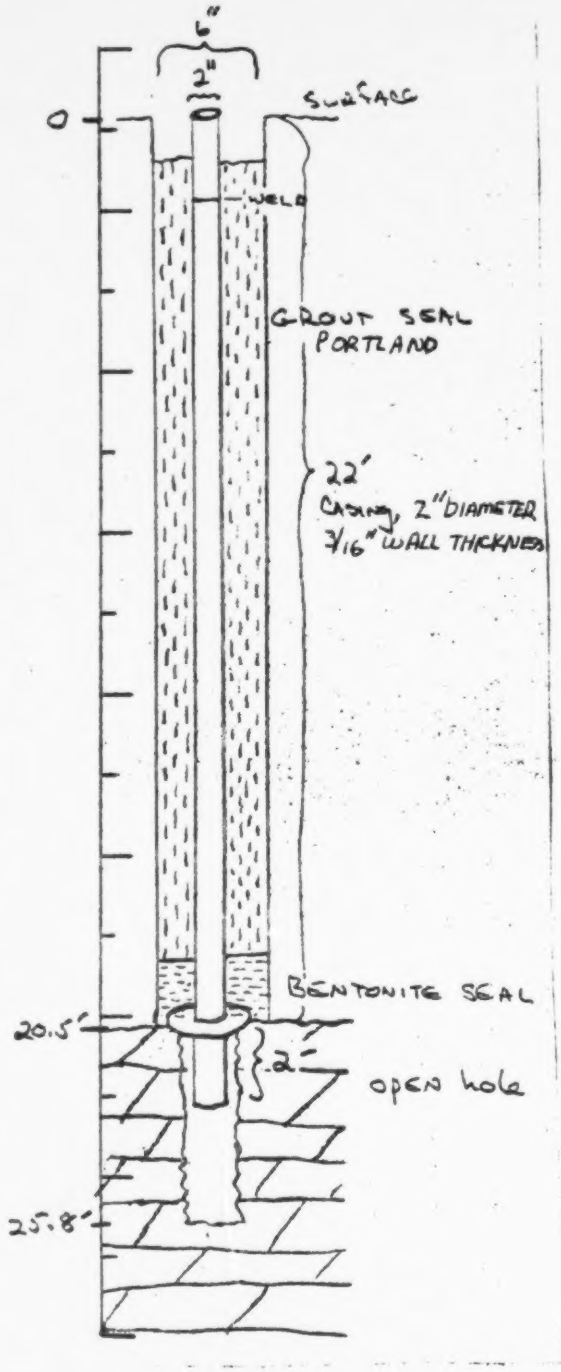
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe and Leo Jensen

Supervisory Geologist Charles Kufs

Well No. 2-B

Project Love Canal

Location NW corner of Brookhaven & Duero Dr.

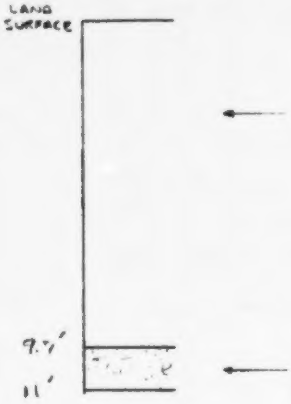
Prepared By: Charles Kufs

Scale: 1cm=1 foot (vert.only)

Date 8/29/80

WELL LOG

PROFILE



DESCRIPTION

LIGHT YELLOW BROWN, CLAY

LIGHT BROWN TO REDDISH BROWN SANDY CLAY WITH ANGULAR FRAGMENTS OF DOLOMITE AND SCHIST.

SCALE: 1 in = 5 ft

PROJECT Love Canal
OWNER Carol L. Yorio
WELL NO. 3-A
LOCATION 400' east of 654 102nd St.

	Date	Time
DRILLING STARTED	9/3/80	8:55
DRILLING COMPLETED	9/3/80	9:50

DRILLER Roger Logel
GEOLOGIST D. Robertson, D. Conover, C. Kufs
RIG TYPE CME-45C
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed 573.4
TOPO POSITION flat lying
PROFILE BY D. Robertson
FIELD BOOK NO. 7 PAGES 3-5

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 11.25'
CASING DIAMETER 2" ID
CASING LENGTH 11'
SCREEN DIAMETER 2"ID
SCREEN SETTING 7.3' - 9.3'
SCREEN SLOT/TYPE .001 Stainless

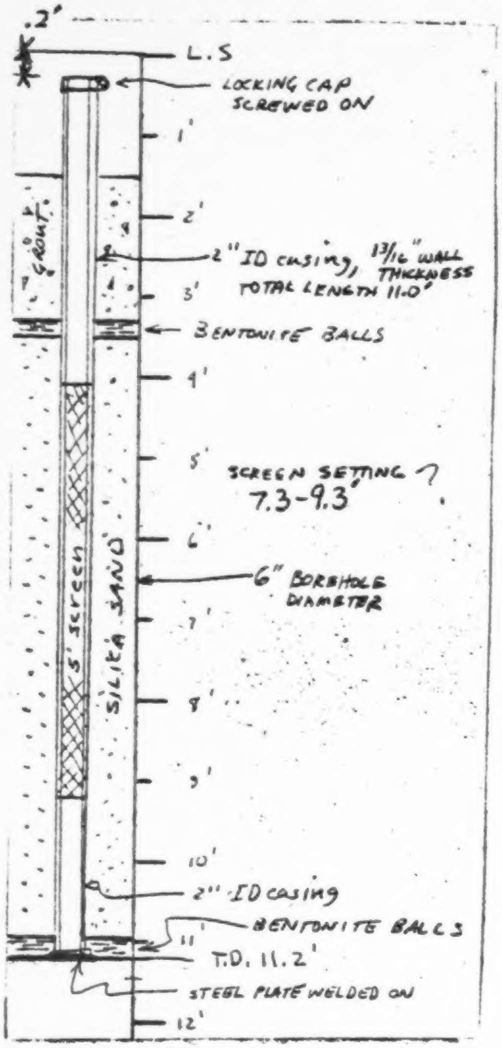
PUMP TEST DATA

STATIC DEPTH TO WATER dry hole
DATE MEASURED 9/3/80
PUMPING DEPTH TO WATER no pump test yet
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Well finished with locked cap

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist D. Robertson, D. Conover, C. Kufs

Well No. 3-A

Project Love Canal

Location 400' east of 654 102nd St.

Prepared By: D. Conover

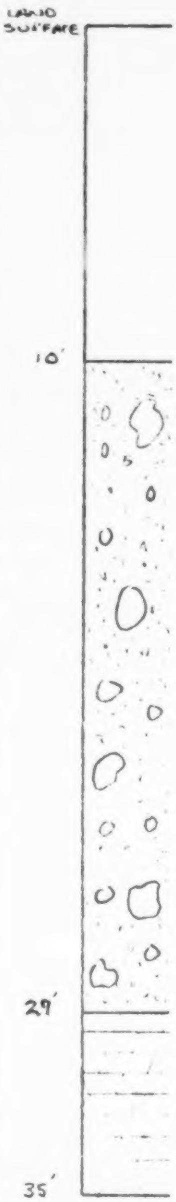
Scale: 1"=2'

Date 9/3/80

WELL LOG

PROFILE

DESCRIPTION



LIGHT YELLOW BROWN CLAY, SOMEWHAT DRY

GLACIAL TILL BROWN SILTY CLAY MATRIX, LARGE ROUNDED GRAY DOLOMITE STONES WITH OCCASIONAL ANGULAR GNEISS STONES

LOCKPORT DOLOMITE

SCALE: 1in = 5 ft.

PROJECT Love Canal

OWNER Carol L. Yorio

WELL NO. 3-B

LOCATION 410 ft. east of 102nd St. #654

	Date	Time
DRILLING STARTED	9/3/80	11:10
DRILLING COMPLETED	9/5/80	17:38

DRILLER Roger Logel

GEOLOGIST D. Robertson

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 573.4

TOPO POSITION flat lying

PROFILE BY D. Robertson

FIELD BOOK NO. 7 PAGES 5-16

WELL DATA

HOLE DIAMETER 6" 2 5/8"

HOLE DEPTH 29' 35'

CASING DIAMETER 2"

CASING LENGTH 29.5'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none .0001"

DEPTH TO BEDROCK 29'

PUMP TEST DATA

STATIC DEPTH TO WATER 7.0'

DATE MEASURED 9/5/80 15:06

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

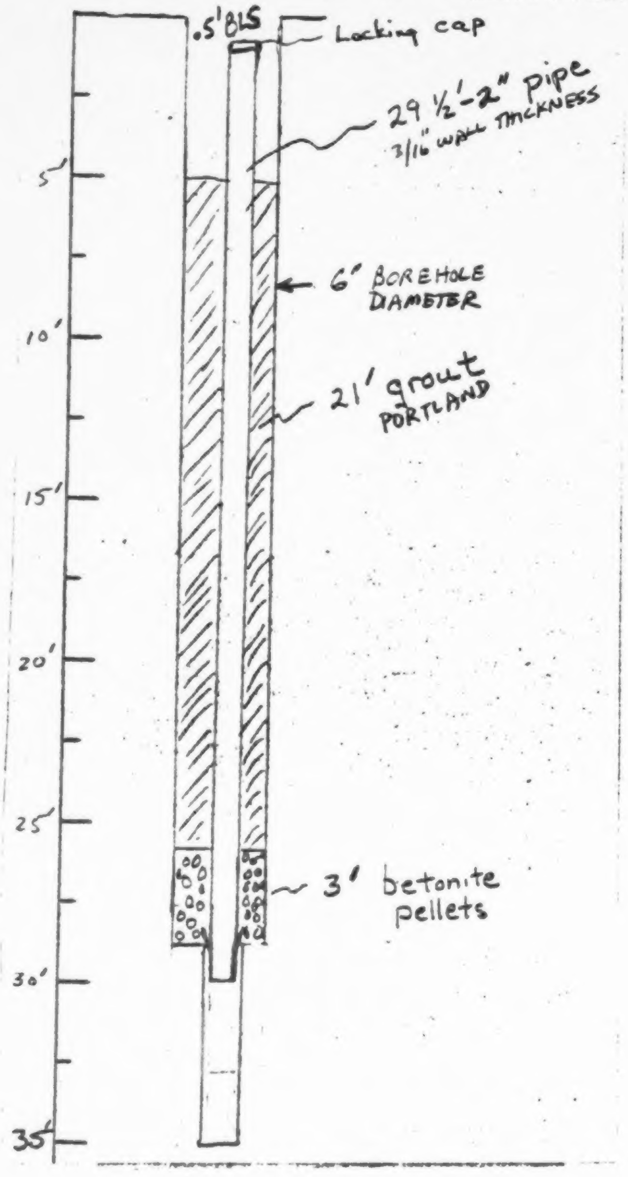
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Well finished with locking cap

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist Dave Robertson

Well No. 3-B

Project Love Canal

Location 410' east of 654 102nd St.

Date 9/5/80

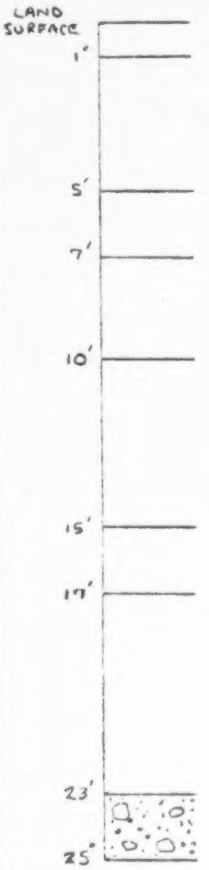
Prepared By: Dave Robertson

Scale: vert. .195"=1'
3.9"=20'

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN LOAM DRY

BROWN SILTY CLAY DRY

DARK BROWN SILTY CLAY, MOIST

REDDISH BROWN CLAY, MOIST

BROWN TO GRAY BROWN CLAY MOIST, STICKY

DARK BROWN CLAY, MOIST STICKY

DARK BROWN CLAY, WET TO VERY WET, STICKY

GLACIAL TILL

SCALE: 1in = 5ft.

PROJECT Love Canal
OWNER State of New York
WELL NO. 4-A
LOCATION near the intersection of Williams Dr. and the entrance to the Robert Moses Expressway

	Date	Time
*DRILLING STARTED	9/2/80	16:20
*DRILLING COMPLETED	9/4/80	10:42

DRILLER Joe Jensen
GEOLOGIST Charlie Kufs
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION ~~not yet surveyed~~ 571.8
TOPO POSITION flat lying
PROFILE BY C. Kufs
FIELD BOOK NO. 3 PAGES 12,13,14

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 25'
CASING DIAMETER 2"
CASING LENGTH 22' and 2' screen
SCREEN DIAMETER 2"
SCREEN SETTING 21 to 23 feet
SCREEN SLOT/TYPE Stainless steel 10 slot .0001"

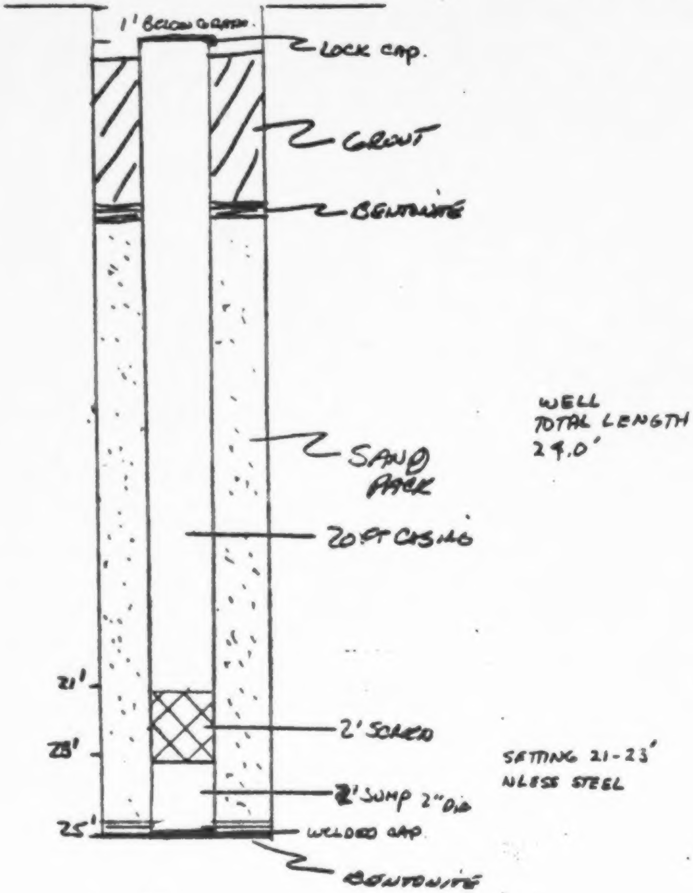
PUMP TEST DATA

STATIC DEPTH TO WATER Dry
DATE MEASURED 9/2, 9/4, 9/5
PUMPING DEPTH TO WATER no pump test yet
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

*Rig did not work on 9/3/80 because the crew had to get physicals

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Charles Kufs

Well No. 4A

Project Love Canal

Location near the intersection of Williams Dr. and the entrance to the Robert Moses Expressway

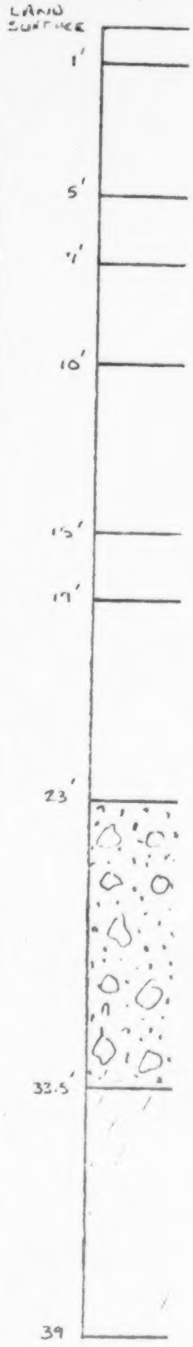
Prepared By: Charles Kufs

Scale: 1"=5'

Date 9/5/80

WELL LOG

PROFILE



DESCRIPTION

DARK BROWN LOAM, DRY

BROWN SILTY CLAY, DRY

DARK BROWN SILTY CLAY, MOIST

REDDISH BROWN CLAY, MOIST

BROWN TO GRAY BROWN CLAY, MOIST, STICKY

DARK BROWN CLAY MOIST, STICKY

DARK BROWN CLAY, WET TO VERY WET, STICKY

GLACIAL TILL

LOCKPORT DOLOMITE

SCALE: 1in = 5 ft

PROJECT Love Canal
OWNER State of New York
WELL NO. 4-B
LOCATION near the intersection of Williams Dr. and the entrance to the Robert Moses Expressway

	Date	Time
*DRILLING STARTED	9/2/80	10:55
*DRILLING COMPLETED	9/4/80	12:25

DRILLER Joe Jensen
GEOLOGIST Charlie Kufs
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed
TOPO POSITION flat lying
PROFILE BY C. Kufs
FIELD BOOK NO. 3 PAGES 9-12, 14-17

WELL DATA

HOLE DIAMETER 6" to 33.6', 3½ " to 38.6'
HOLE DEPTH 39'
CASING DIAMETER 2"
CASING LENGTH 34.6'
SCREEN DIAMETER no screen
SCREEN SETTING no screen
SCREEN SLOT/TYPE no screen
DEPTH TO BEDROCK 33.5'

PUMP TEST DATA

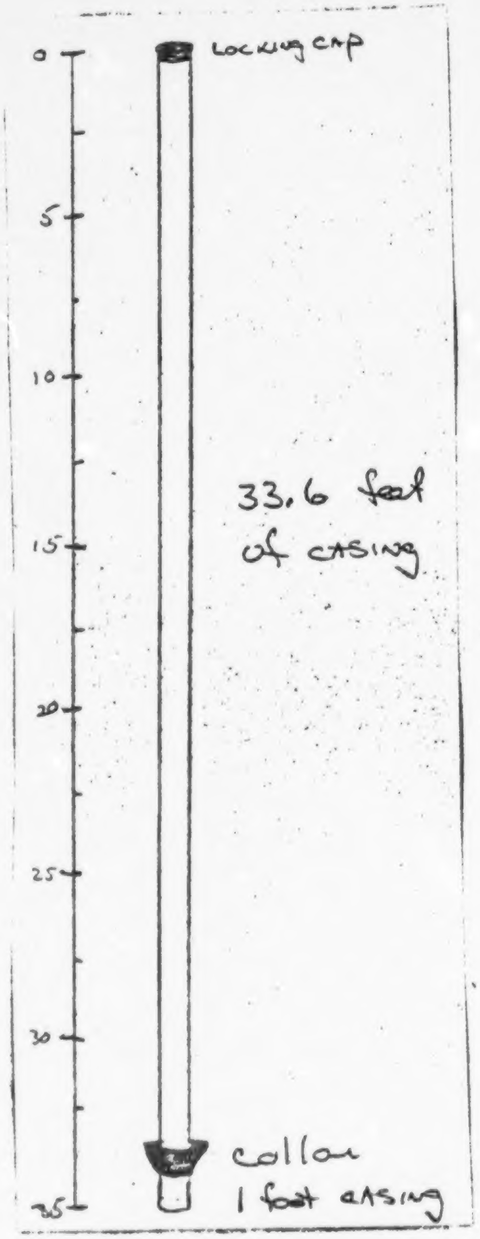
STATIC DEPTH TO WATER 11.6'
DATE MEASURED 9/4/80 13:05
PUMPING DEPTH TO WATER no pump test yet
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

* Rig did not work on 9/3/80 because the crew had to get physicals

**water at top of casing at 17:10 on 9/4/80 and about a foot down at about 8:30 on 9/5/80

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Charles Kufs

Well No. 4-B

Project Love Canal

Location near the intersection of Williams Dr. and the entrance to the Robert Moses Expressway

Prepared By: Charles Kufs

Scale: 1"=5'

Date 9/5/80

WELL LOG

PROFILE	DESCRIPTION
0	Dark Brown Silt Loam
1'	Brown Sandy Loam
3'	Reddish Brown Silty Clay
7'	Gray Brown Silty Clay, with Increasing Moisture Toward The Bottom
24'	Gravelly, Sandy, Silty Clay
25.5'	Till
34'	Bedrock - Lockport Dolomite

PROJECT Love Canal

OWNER State of New York

WELL NO. 4-B-2

LOCATION near the intersection of Williams Dr. and the entrance to Robert Moses Parkway

	Date	Time
DRILLING STARTED	9/27/80,	1130
DRILLING COMPLETED	10/3/80	1610

DRILLER Mike Warner

GEOLOGIST Tom Bolyard/Alfred Wickline

RIG TYPE CME-55

REFERENCE POINT ground surface

R.P. ELEVATION not yet surveyed 571.8

TOPO POSITION flat lying

PROFILE BY Tom Bolyard/Alfred Wickline

FIELD BOOK NO. 6 PAGES 80-85,96-97

WELL DATA

HOLE DIAMETER 6" to 34'; 3" to 39'

HOLE DEPTH 39'

CASING DIAMETER 4"

CASING LENGTH 34'

SCREEN DIAMETER no screen

SCREEN SETTING no screen

SCREEN SLOT/TYPE no screen .0001"

DEPTH TO BEDROCK 34'

PUMP TEST DATA

STATIC DEPTH TO WATER not yet measured

DATE MEASURED

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

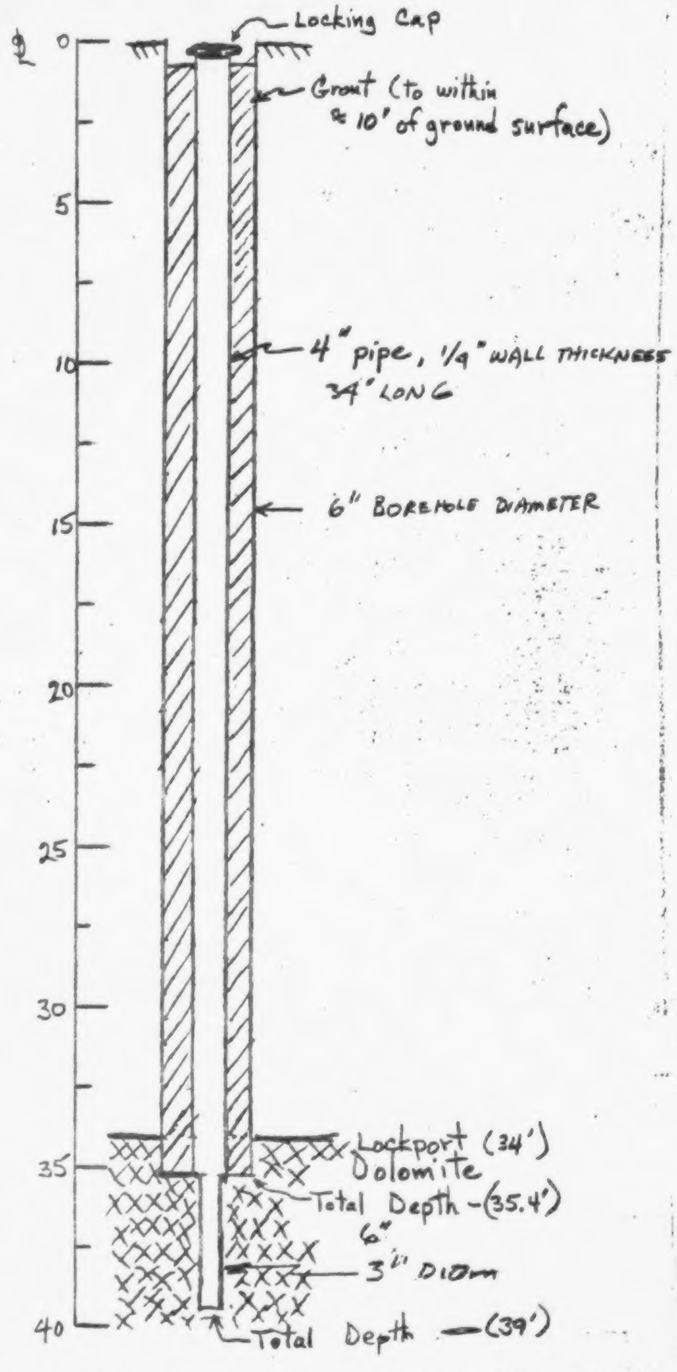
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type a CME-55
Driller Mike Warner
Supervisory Geologist Tom Bolyard

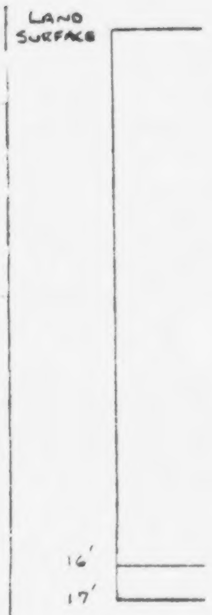
Well No. 4-B-2
Project Love Canal
Location near the intersection of Williams Dr. and the entrance to Robert Moses Parkway
Date 9/29/80

Prepared By: Tom Bolyard
Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



FILL MATERIAL BLACK AND GRAY. SAND, GRAVEL, BROKEN. GLASS.

SANDY CLAY. BLACK

SCALE: 1in = 5ft.

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 5-A

LOCATION 260' S. Hiway 384 (Buffalo Ave.)
in park just west of 102nd St. dump

	Date	Time
DRILLING STARTED	9/4/80	14:00
DRILLING COMPLETED	9/5/80	1012

DRILLER Mike Warner

GEOLOGIST D. Conover

RIG TYPE CME - 55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 573.4

TOPO POSITION flat lying

PROFILE BY D. Conover

FIELD BOOK NO. 8 PAGES 5-9

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 17'

CASING DIAMETER 2" ID

CASING LENGTH 2' Tail, 12½'Main

SCREEN DIAMETER 2"

SCREEN SETTING Between 13, 15 feet

SCREEN SLOT/TYPE Vertical slot .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER 7.2'

DATE MEASURED 9/8/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

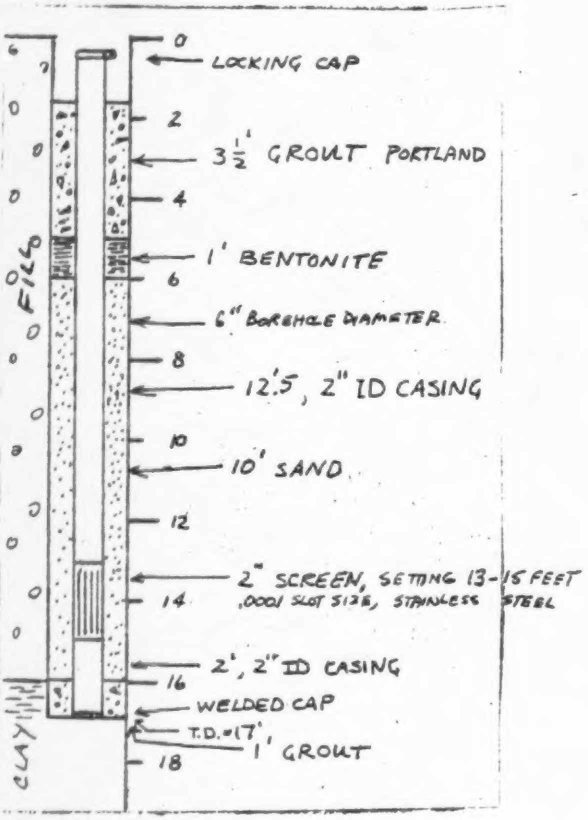
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dave Conover

Well No. 5-A

Project Love Canal

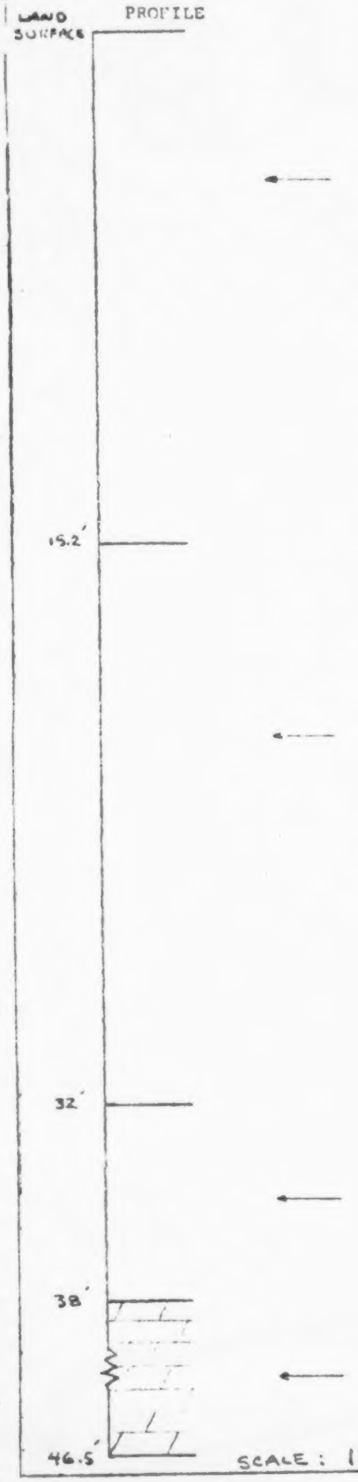
Location 260' south of Hiway 384 (Buffalo Ave.) in park just west of 102nd St. dump

Date 9/5/80

Prepared By: Dave Conover

Scale: 1"=4'

WELL LOG



DESCRIPTION

FILL MATERIAL
BLACK AND
DARK GRAY

SANDY CLAY.
RANGES FROM
BLACK TO
LIGHT GRAY

RED CLAY.
WITH SOLID
INCLUSIONS

LOCKPORT
DOLOMITE

SCALE: 1 in = 5 ft.

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 5-B

LOCATION 260' S. Hiway 384 (Buffalo Ave.)
just west of 102nd St. dump

	Date	Time
DRILLING STARTED	9/5/80	08:00
DRILLING COMPLETED	9/8/80	16:00

DRILLER Mike Warner

GEOLOGIST D. Conover

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 573.4

TOPO POSITION flat lying

PROFILE BY D. Conover

FIELD BOOK NO. 8 PAGES 7-17

WELL DATA

HOLE DIAMETER 6", 3" in dolomite

HOLE DEPTH 46.5'

CASING DIAMETER 2" ID

CASING LENGTH 38.8'

SCREEN DIAMETER none

SCREEN SETTING "

SCREEN SLOT/TYPE " .0001"

DEPTH TO BEDROCK 38'

PUMP TEST DATA

STATIC DEPTH TO WATER 9.1'

DATE MEASURED 9/8/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

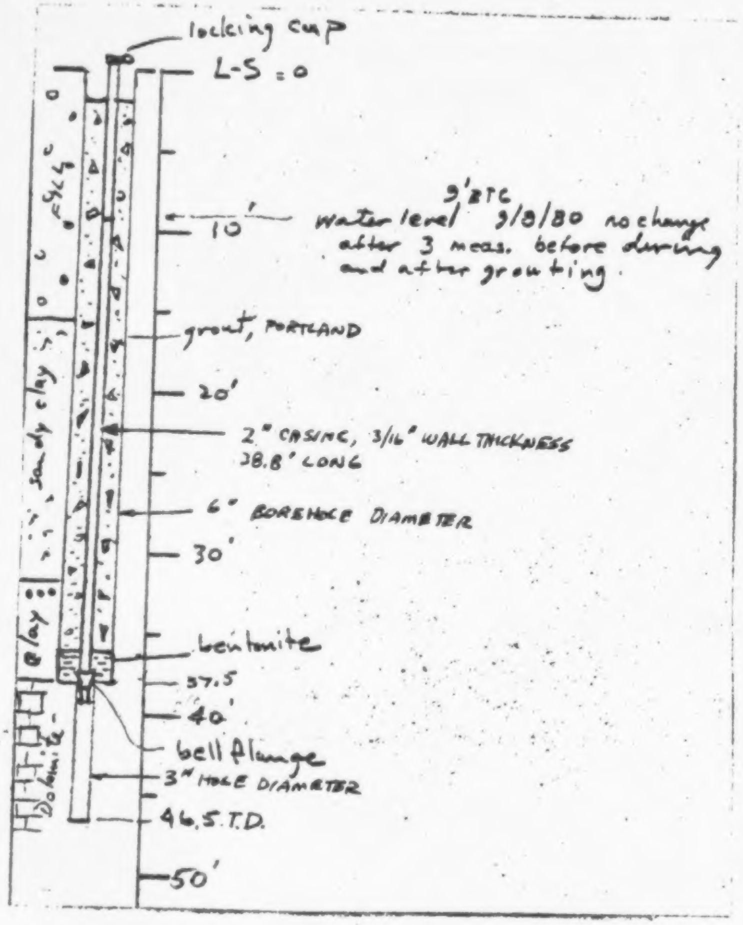
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Considerable sloughing from till zone. Hole caved from 37.5 to 21' after removing augers.

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
    - Material
    - Diameter
    - Slot Openings
    - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dave Conover

Well No. 5-B

Project Love Canal

Location 260' south of Hiway 384 (Buffalo Ave.) just west of 102nd St. dump

Date 9/8/80

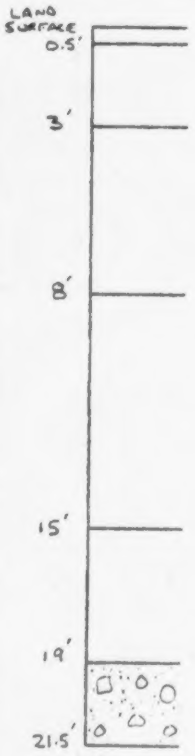
Prepared By: Dave Conover

Scale: 1"=10'

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN SILTY CLAY LOAM, DRY

BROWN SILTY CLAY, DRY

DARK BROWN CLAY, SLIGHTLY MOIST.

DARK REDDISH BROWN CLAY, MOIST

DARK REDDISH BROWN CLAY, VERY MOIST, STICKY

GLACIAL TILL

SCALE : 1in = 5ft

PROJECT Love Canal Project

OWNER City of Niagara Falls

WELL NO. 6-A

LOCATION 300' north of Frontier Ave. and
380 ' east of 93rd St.

	Date	Time
DRILLING STARTED	9/4/80	13:12
DRILLING COMPLETED	9/4/80	14:05

DRILLER Ed Cole

GEOLOGIST Tom Bolyard

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 572.1

TOPO POSITION flat lying

PROFILE BY Tom Bolyard

FIELD BOOK NO. 6 PAGES 3-5

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 21.5'

CASING DIAMETER 2"

CASING LENGTH 22'

SCREEN DIAMETER 2"

SCREEN SETTING 15-17'

SCREEN SLOT/TYPE Johnson 10-slot
.0001"

PUMP TEST DATA

STATIC DEPTH TO WATER 15'

DATE MEASURED 9/4/80

PUMPING DEPTH TO WATER no pump test yet

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

PUMP SETTING

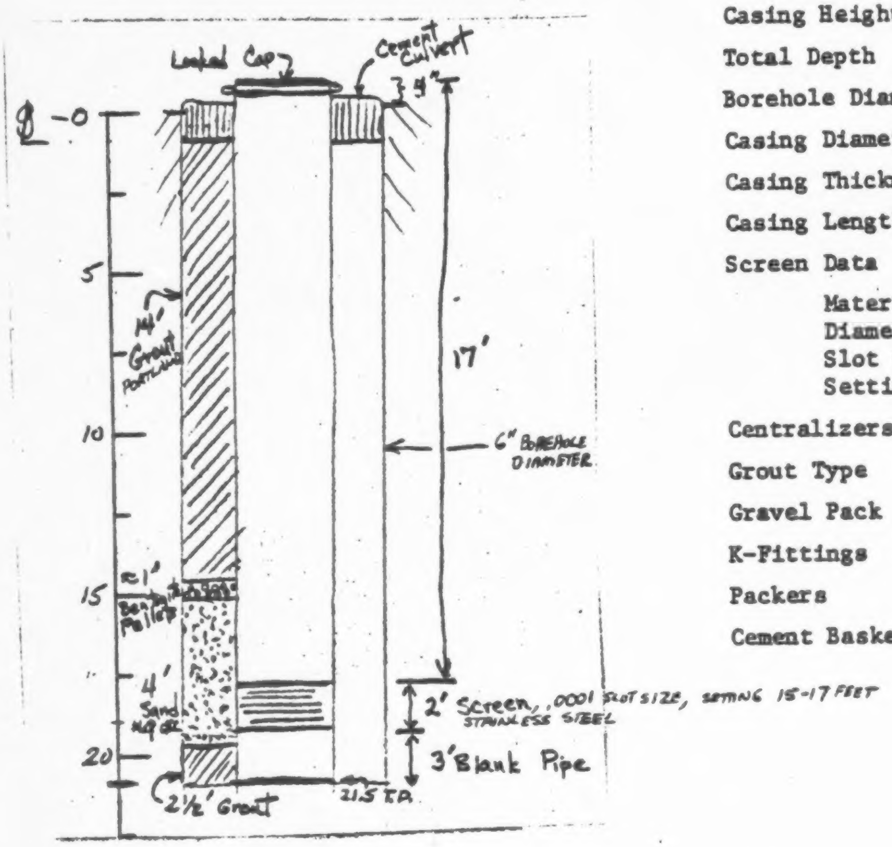
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets



Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist Tom Bolyard

Well No. 6-A

Project Love Canal

Location 300' north of Frontier Ave. and 380' east of 93rd St.

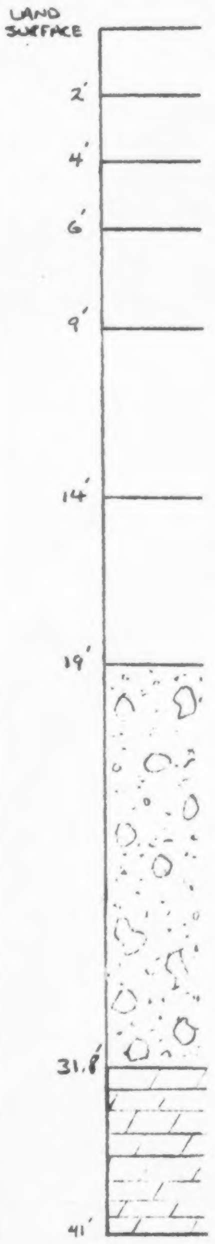
Prepared By: Tom Bolyard

Scale: 1"=5'

Date 9/4/80

WELL LOG

PROFILE



DESCRIPTION

DARK BROWN SILTY CLAY LOAM, DRY

LIGHT BROWN SILTY CLAY LOAM DRY

BROWN CLAY SLIGHTLY MOIST

DARK REDDISH BROWN CLAY, MOIST

DARK BROWNISH GRAY CLAY, MOIST

DARK BROWNISH GRAY CLAY, MOIST, STICKY

GLACIAL TILL

LOCKPORT DOLOMITE

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 6-B

LOCATION 300' north of Frontier Ave. and
380' east of 93rd St.

	Date	Time
DRILLING STARTED	9/5/80	07:55
DRILLING COMPLETED	9/5/80	11:03

DRILLER Ed Cole / Joe Genovese

GEOLOGIST Tom Bolyard

RIG TYPE Acker AD-2 / CME-45

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 572.1

TOPO POSITION flat lying

PROFILE BY Tom Bolyard

FIELD BOOK NO. 6 PAGES 6-8

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 37.8'

CASING DIAMETER 2"

CASING LENGTH 36'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A .0001"

DEPTH TO BEDROCK 31.8'

PUMP TEST DATA

STATIC DEPTH TO WATER 7.72'

DATE MEASURED 9/8/80

PUMPING DEPTH TO WATER no pump test yet

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

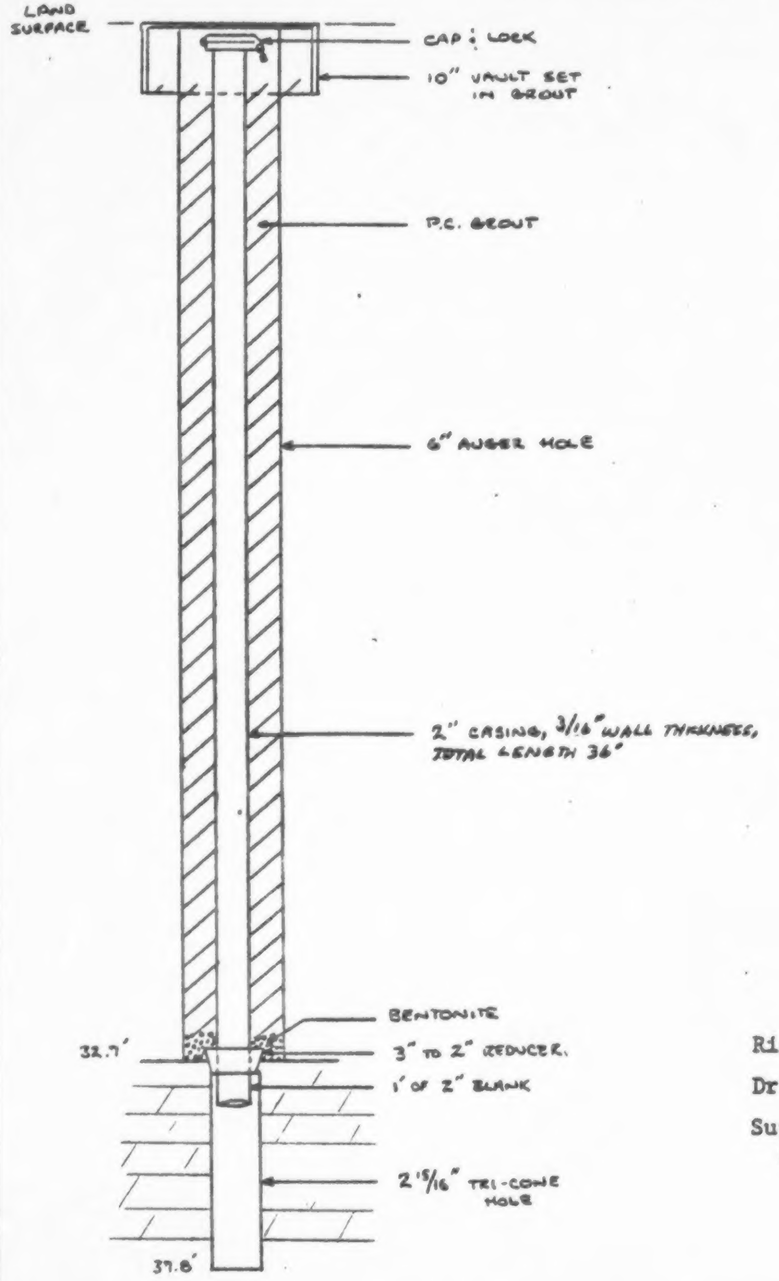
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

See core log for bedrock detail

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45 / ACKER-AD-2

Driller Joe Genovese / Ed Cole

Supervisory Geologist Dennis Stanczuk

Well No. 6-B

Project Love Canal

Location near Frontier Ave. and 93rd behind apartments

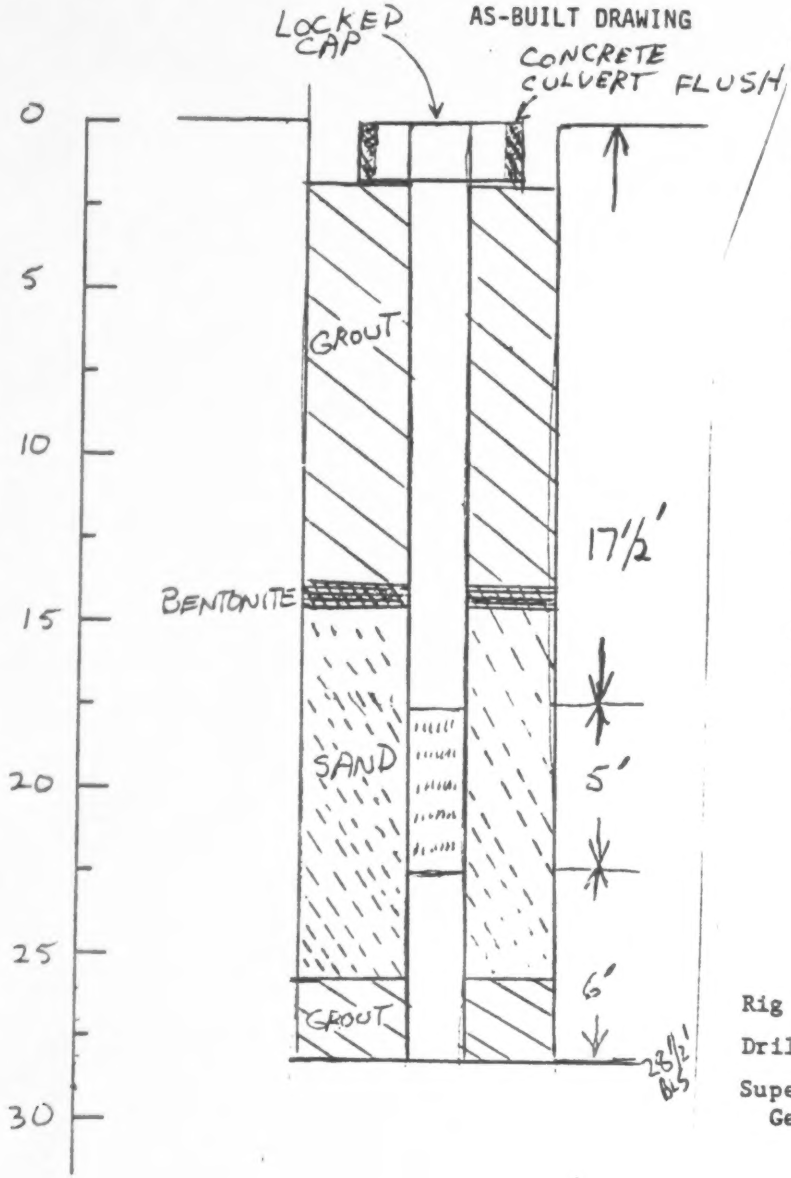
Prepared By: Dennis Stanczuk

Scale: 1"=5'

Date 9/6/80

AS-BUILT DRAWING

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Mobile B-56

Driller Pat Parmentier

Supervisory Geologist Dennis Stanczuk

Well No. 7-A

Project Love Canal

Location 92nd St. opposite house 619

Prepared By: Dennis Stanczuk

Scale: 1"=5'

Date 9/3/80

WELL LOG

PROFILE	DESCRIPTION
0	TOPSOIL BROWN LOAM
	SUBSOIL LIGHT BROWN LOAM
	DARK BROWN SANDY LOAM
5	DARK BROWN FINE SANDY LOAM
	REDDISH BROWN SILTY CLAY
	BROWNISH GRAY SILTY CLAY
10	
	DARK BROWN SILTY CLAY
15	MORE MOIST
	DARK BROWN CLAY
	DARK BROWN CLAY MORE MOIST
20	GRAY HARD LAYER
	GRAY CLAY
	GRAY CLAY VERY DENSE
25	MOISTURE INCREASE
	TILL SAND - SMALL GRAVEL - SILTY CLAY
30	

PROJECT LOVE CANAL

OWNER CITY OF NIAGARA FALLS

WELL NO. 7A

LOCATION 92nd ST. OPPOSITE HOUSE #619 IN PLAYGROUND

	Date	Time
DRILLING STARTED	9-13-80	
DRILLING COMPLETED	9-13-80	

DRILLER PAT PARMENTIER

GEOLOGIST DENNIS STANCZUK

RIG TYPE MOBILE B-56

REFERENCE POINT LAND SURFACE

R.P. ELEVATION 5734

TOPO POSITION FLAT

PROFILE BY DENNIS STANCZUK

FIELD BOOK NO. 2 PAGES 14-15

WELL DATA

HOLE DIAMETER 6

HOLE DEPTH 30 FEET

CASING DIAMETER 2 INCHES

CASING LENGTH 28½

SCREEN DIAMETER 2 INCHES

SCREEN SETTING 22½ - 17½

SCREEN SLOT/TYPE 1 INCH

PUMP TEST DATA

STATIC DEPTH TO WATER DRY

DATE MEASURED 9-13-80

PUMPING DEPTH TO WATER NOT TESTED

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

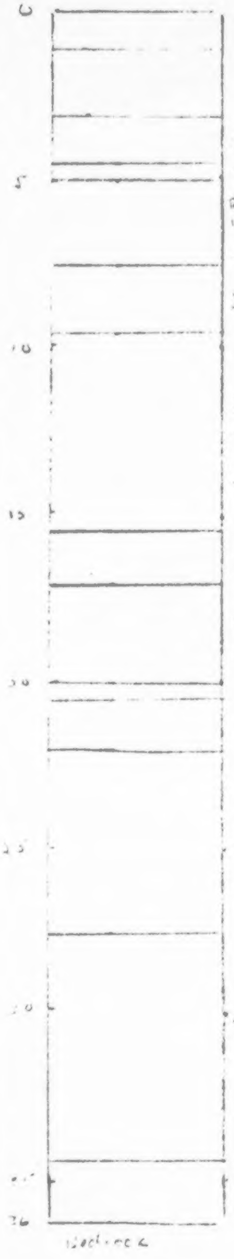
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

WELL LOG

PROFILE



DESCRIPTION

Topsoil Brown loam
subsoil Light Brown loam
Dark brown sandy loam
Dark brown fine sandy loam
Reddish Brown silty clay
increase moisture
Brownish gray silty clay
Dark brown
Silty clay
moisture increase
Dark brown clay
Dark brown
clay increase in moisture
Gray sand layer
Gray clay
Gray clay very dense
moisture increase
no visible [illegible]
Till sand + small gravel silt + clay
Till coarse sand + gravel

Well was grouted with portland cement from bedrock contact to the surface

PROJECT Love Canal
OWNER City of Niagara Falls
WELL NO. 7-B-1
LOCATION 92nd St. opposite house #619 in playground

	Date	Time
DRILLING STARTED	9/8/80	12:40
DRILLING COMPLETED	Not completed - abandoned	

DRILLER Ed Cole
GEOLOGIST Alfred Wickline
RIG TYPE Acker - AD-2
REFERENCE POINT land surface
R.P. ELEVATION no survey yet 573.4
TOPO POSITION flat lying
PROFILE BY Alfred Wickline
FIELD BOOK NO. 6 PAGES 15-19

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 36'
CASING DIAMETER well was not completed
CASING LENGTH N/A
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A .0001"
DEPTH TO BEDROCK 36'

PUMP TEST DATA

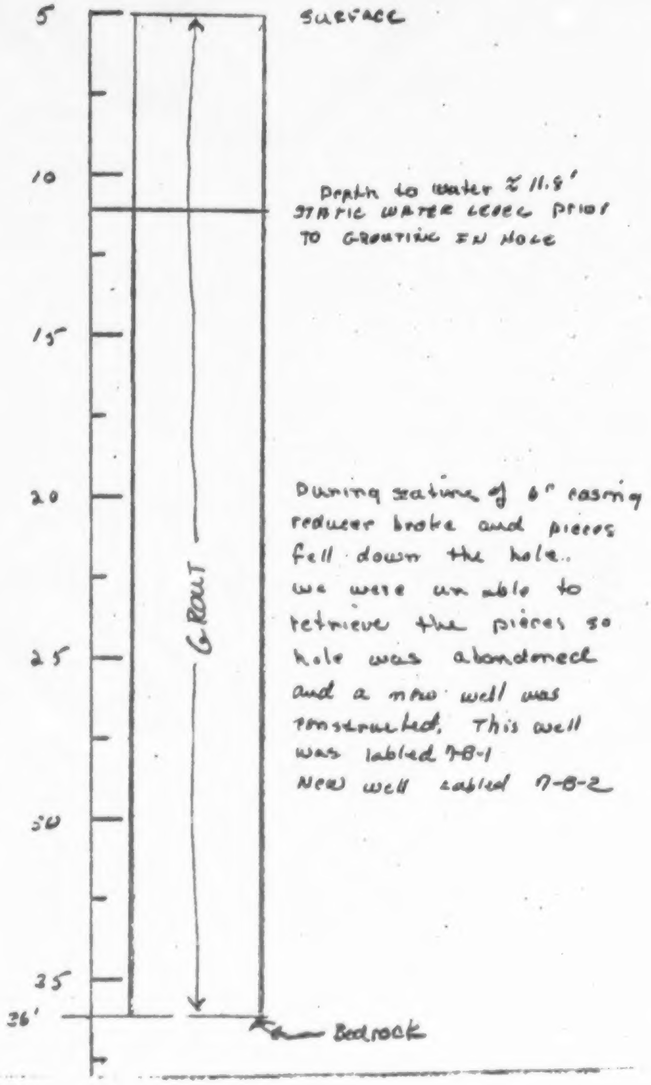
STATIC DEPTH TO WATER
DATE MEASURED
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

36' to bedrock 9/8/80

During the process of driving 6" casing reducer broke and pieces fell into hole preventing the completion. The hole was abandoned and a new well constructed.

AS-BUILT DRAWING



Depth to water ≈ 11.8'
STATIC WATER LEVEL PRIOR
TO GROUTING IN HOLE

During seating of 6" casing
reducer broke and pieces
fell down the hole..
we were unable to
retrieve the pieces so
hole was abandoned
and a new well was
constructed. This well
was labled 7B-1
New well labled 7-B-2

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
- Material
- Diameter
- Slot Openings
- Settings

Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

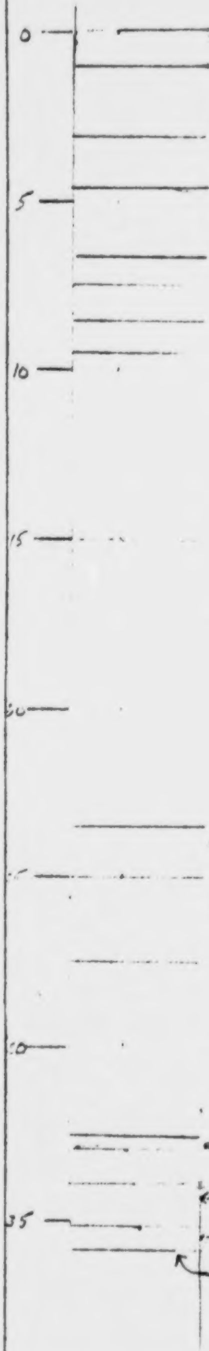
Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist Alfred Wickline

Well No. 7B-1
Project Love Canal
Location 92nd St. opposite house #619 in playground
Date 9/9/80

Prepared By: Alfred Wickline
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



Brown sandyloam Topsoil

light Brown loam sub soil

Brown sandy loam

Brown clay loam

Reddish silty clay increase in moisture

Light brown silty clay

Brown silty clay increase in moisture

Gray clay

Gray clay more moist than upper part.

Gray clay with coarse material Harder drilling than before.

Pebbly Gray clay

Till

← Boulder ≈ 1 ft thick

← Boulder

← Boulder

Bedrock (36')

PROJECT Love Canal
OWNER City of Niagara Falls
WELL NO. 7B-2
LOCATION 92nd St. across street from house #619 in playground
29.8' from curb, 9.8' north of hole 7-B

	Date	Time
DRILLING STARTED	9/9/80	1209
DRILLING COMPLETED	9/10/80	1715

DRILLER Ed Ward
GEOLOGIST Alfred Wickline
RIG TYPE Acker AD-2
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed
TOPO POSITION flat lying - affected by local const
PROFILE BY Alfred Wickline
FIELD BOOK NO. 6 PAGES 23-30

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 34'
CASING DIAMETER 6"
CASING LENGTH 34'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
DEPTH TO BEDROCK 36'

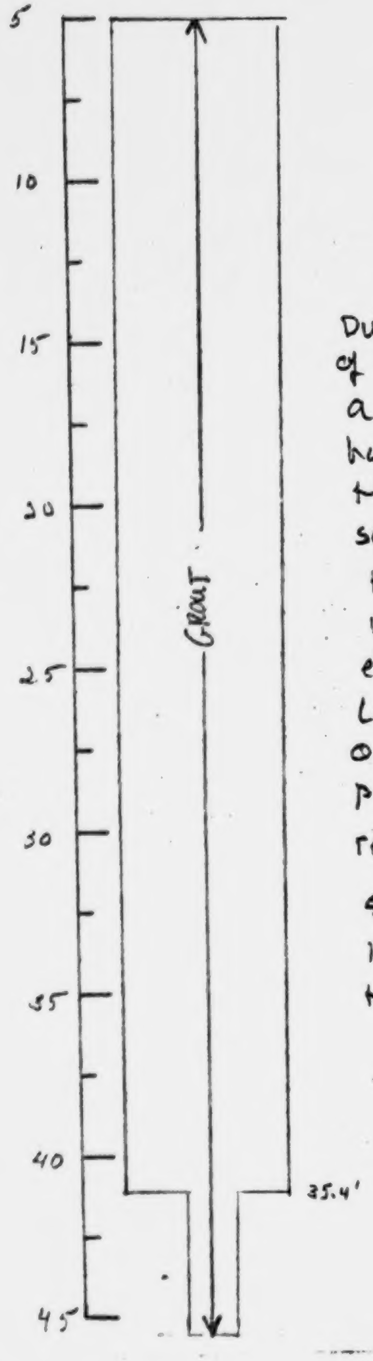
PUMP TEST DATA

STATIC DEPTH TO WATER Dry Hole
DATE MEASURED 9/9/80 1322 hrs.
PUMPING DEPTH TO WATER N/A
TEST DURATION N/A
PUMPING RATE N/A
TEST DATE N/A
TEST TYPE N/A
PUMP SETTING N/A
SPECIFIC CAPACITY N/A

REMARKS

Well dry 9/9/80 1730 hrs. cored through boulder. Assumed we were on bedrock. During well completion reducer leaked. Turned out to be another boulder. Grout leaked into hole. Had to abandon sealed hole to surface 1715 hrs. 9/10/80. See Addendum sheet.

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation	Not surveyed
Casing Height Above L-S	N/A
Total Depth	38.9
Borehole Diameter	6" to 34.4 2" to 38.9
Casing Diameter	
Casing Thickness	
Casing Lengths	
Screen Data	
Material	
Diameter	
Slot Openings	
Settings	
Centralizers	
Grout Type	
Gravel Pack	
K-Fittings	
Packers	
Cement Baskets	

During completion of hole encountered a leaky reducer had to abandon the hole. Problem seemed to be that bedrock was not actually encountered but a large boulder or a dislodged piece of bedrock reducer would not seat. Grout leaked into hole preventing the completion

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist Alfred Wickline

Well No. 7B-2

Project Love Canal

Location 92nd St., across from house #619 in playground

Date 9/10/80

Prepared By: Alfred Wickline

Scale: 1"=5'

SUMMARY OF HOLE 7B-2

1. Drilled and logged to 33.5 feet, hit boulder and continued through.

2. Encountered rock at 34' split spoon would not take sample. Two foot difference in bedrock between site 7B-1 and 7B-2

3. No sand and gravel layer encountered - (probably due to boulder.

4. Cored hole to see if the hard layer was a boulder or bedrock. Core showed the material to be dolomite.

5. Completed hole but the seal around the reducer would not hold; grout filtered into 3 inch hole. What was thought to be bedrock turned out to be a boulder in contact with bedrock.

6. Hole was abandoned and grouted shut.

ADDENDUM FOR WELL 7B-2

During the process of drilling 6" hole we encountered what we thought was bedrock. Upon coring it turned out to be a large boulder. Continued driving 6" casing to a depth of 35.4 feet and encountered what we thought was bedrock. Used split spoon to try to insure we were on bedrock. The spoon would not collect sample and just bounced, therefore; we concluded that we were on bedrock. Cored 4.5 feet into bedrock and prepared to complete the hole. Sounded hole depth and water level to see if hole was cleaned out adequately. We next set inch casing and added bentonite. Allowed bentonite to sit for 30 minutes to insure adequate swelling had taken place. Sounded water level in 6 inch casing bentonite level, and water level in 2 inch casing.

DTW 6" casing 8.45'

DTW 2" casing 8.24'

Put 1 bag of grout in hole. Measured water level in 2" casing again.

DTW 2" casing 8.02'

Put in additional bag of grout

DTW 2" casing 7.94'

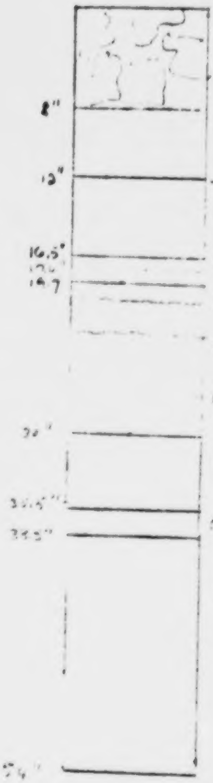
Water level in 2" casing rising, therefore; the reducer is leaking.

Dropped a coupling on a rope down the 2" hole , retrived grouty water. The only alternative was to abandon the hole.

WELL LOG

PROFILE

DESCRIPTION



Boulder in contact with bedrock Fractured.

Porous dolomite

Broken

Porous dolomite visible calcite stringers

Porous dolomite

Porous dolomite

fracture

fracture

Very porous dolomite

less calcite

fracture

less porous dolomite

[illegible] visible calcite

dolomite - non-porous calcite stringers

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 7B-3

LOCATION 92nd St. across the street from house #619 in playground

	Date	Time
DRILLING STARTED	9/9/80	1209
DRILLING COMPLETED	9/10/80	1755

DRILLER Ed Cole

GEOLOGIST Alfred Wickline

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION has not been surveyed 573.4

TOPO POSITION flat lying

PROFILE BY

FIELD BOOK NO. PAGES

WELL DATA

HOLE DIAMETER 1 7/8"

HOLE DEPTH 4½'

CASING DIAMETER N/A

CASING LENGTH N/A

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER N/A

DATE MEASURED N/A

PUMPING DEPTH TO WATER N/A

TEST DURATION N/A

PUMPING RATE N/A

TEST DATE N/A

TEST TYPE N/A

PUMP SETTING N/A

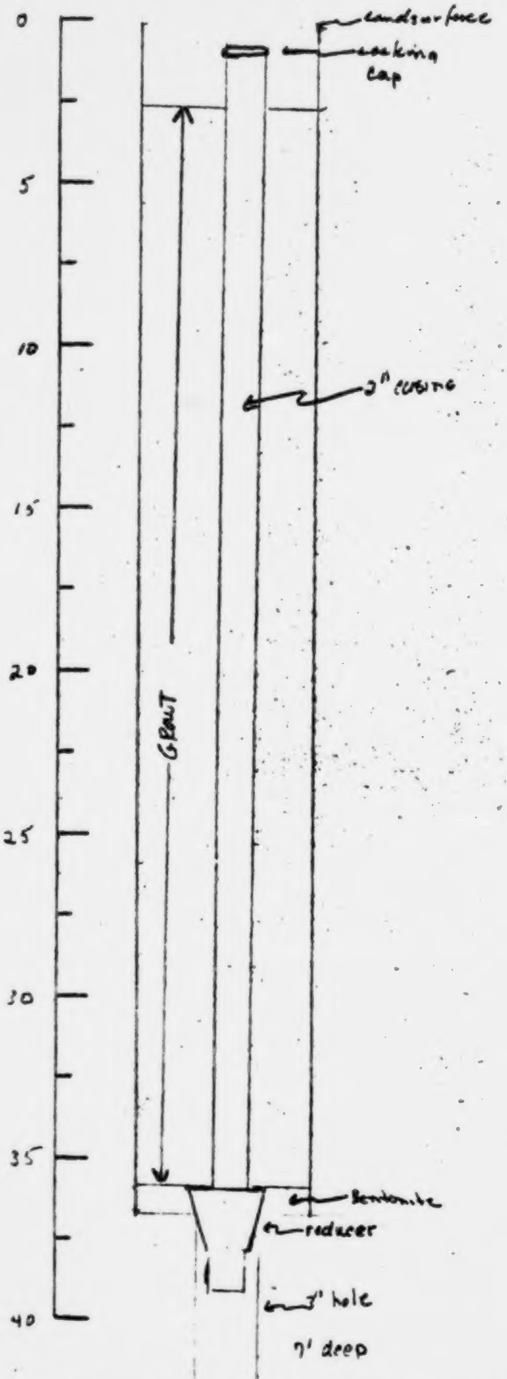
SPECIFIC CAPACITY N/A

REMARKS

core description of hole 7B-2

no core was taken on hole 7B-3

AS-BUILT DRAWING



CHECKLIST

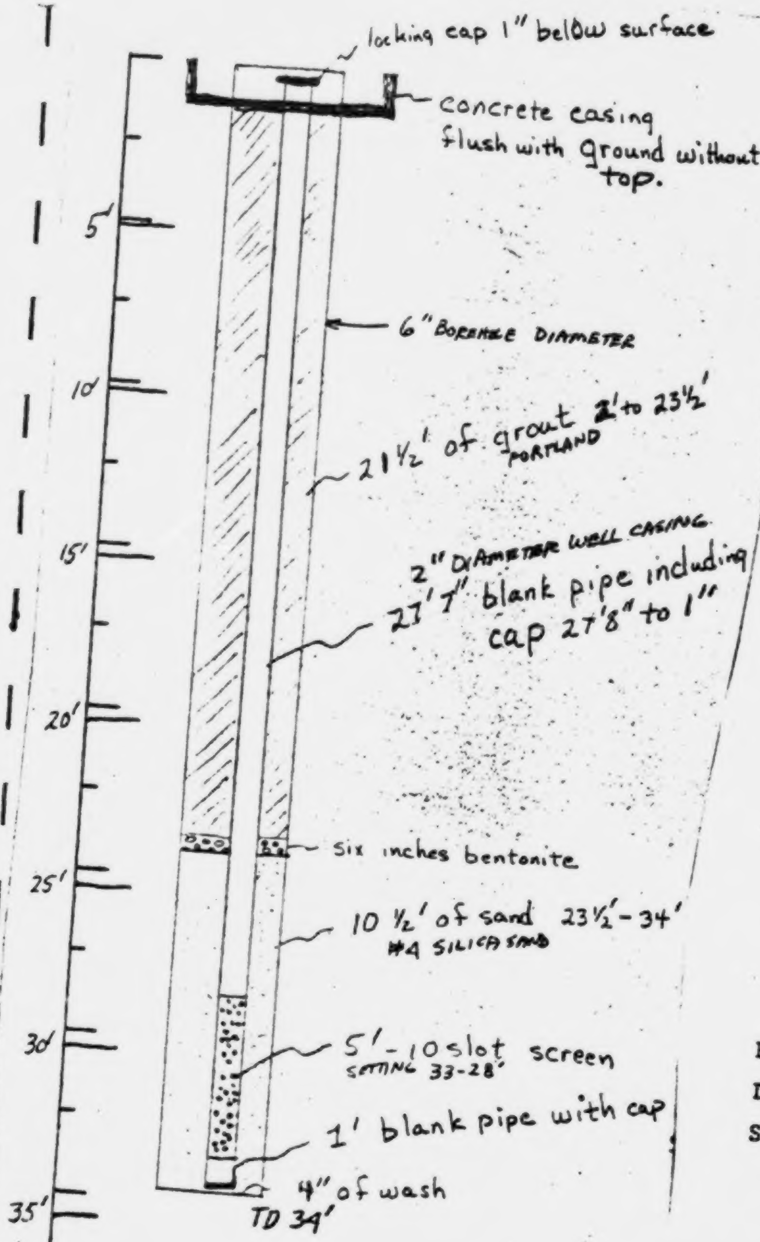
Land Surface Elevation not surveyed
Casing Height Above L-S 6"below
Total Depth -43.1'
Borehole Diameter 3"
Casing Diameter 2"
Casing Thickness 3/16"
Casing Lengths 37.5'
Screen Data N/A Open hole
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type Euron Type II Portlend cement
Gravel Pack N/A
K-Fittings N/A
Packers N/A
Cement Baskets N/A

Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist Alfred Wickline

Well No. 7B-3
Project Love Canal
Location across street from house #619
Date 9/9/80

Prepared By: Alfred Wickline
Scale: 1"=5'

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME45-C

Driller Roger Logel

Supervisory Geologist David Robertson

Well No. 8A

Project Love Canal

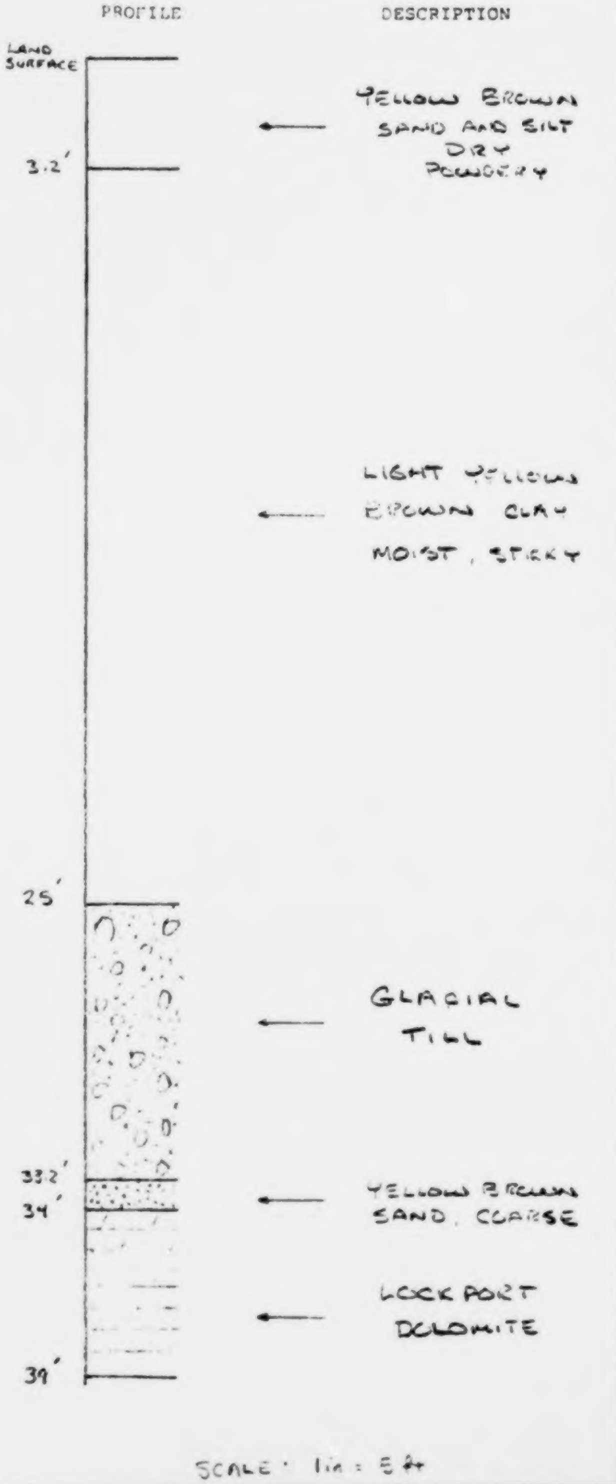
Location 32.2m east of 93rd St. across from 908 and 912 boundary

Date 9/9/80

Prepared By: David Robertson

Scale: 1"=5'

WELL LOG


PROFILE
DESCRIPTION
LAND SURFACE
YELLOW BROWN SAND AND SILT DRY POWDERY
3.2'
LIGHT YELLOW BROWN CLAY MOIST, STICKY
25'
GLACIAL TILL
33.2'
34'
YELLOW BROWN SAND, COARSE
LOCKPORT DOLOMITE
39'
SCALE: 1in = 5 ft

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 8-B

LOCATION 29.5 m east of 93rd St. across from 908 and 912 lot line

	Date	Time
DRILLING STARTED	9/6/80	11:09
DRILLING COMPLETED	9/8/80	15:27

DRILLER Roger Logel

GEOLOGIST D. Robertson

RIG TYPE CME-45C

REFERENCE POINT ground level

R.P. ELEVATION not surveyed yet 573.2

TOPO POSITION flat lying

PROFILE BY D. Robertson

FIELD BOOK NO. 7. PAGES 17-25

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 39'

CASING DIAMETER 2"

CASING LENGTH 34.5'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none .0001"

DEPTH TO BEDROCK 34'

PUMP TEST DATA

STATIC DEPTH TO WATER 8.58'

DATE MEASURED 9/8/80 10:26

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

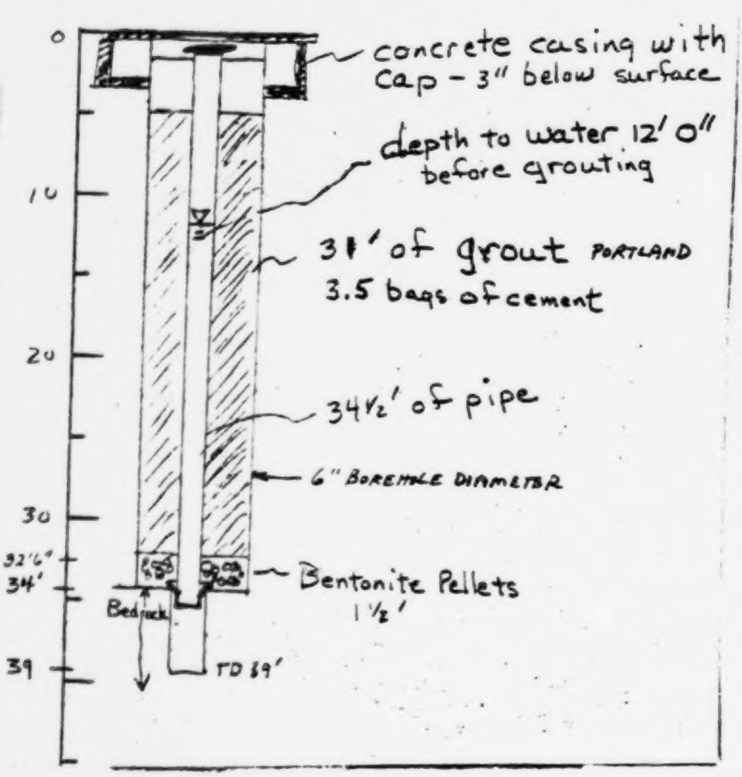
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Well complete with locking cap

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist David Robertson

Well No. 8B

Project Love Canal

Location 29.5m east of 93rd St. across from 908 and 912 boundary

Date 9/8/80

Prepared By: David Robertson

Scale: 1"=10'

WELL LOG

PROFILE	DESCRIPTION
0	
	YELLOW BROWN SILTY LOAM
3' 3.5'	CONCRETE AND GRAVEL
	BROWN SILTY LOAM
7' 8'	YELLOWISH BROWN CLAY MOIST
	YELLOWISH BROWN TO REDDISH BROWN CLAY
11'	
	SILTY CLAYEY REDDISH BROWN TILL SILT PARTINGS
15'	

PROJECT Love Canal Study
OWNER Elmen Wilcox
WELL NO. 9-A
LOCATION NW corner of intersection of Pasadena Ave. and Brookside Dr.

	Date	Time
DRILLING STARTED	9/3/80	16:18
DRILLING COMPLETED	9/3/80	16:50

DRILLER Pat Parmentier
GEOLOGIST Dennis T. Stanczuk
RIG TYPE Mobile B-56
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed 573.4
TOPO POSITION flood plain
PROFILE BY Dennis T. Stanczuk
FIELD BOOK NO. 2 PAGES 16-17

WELL DATA

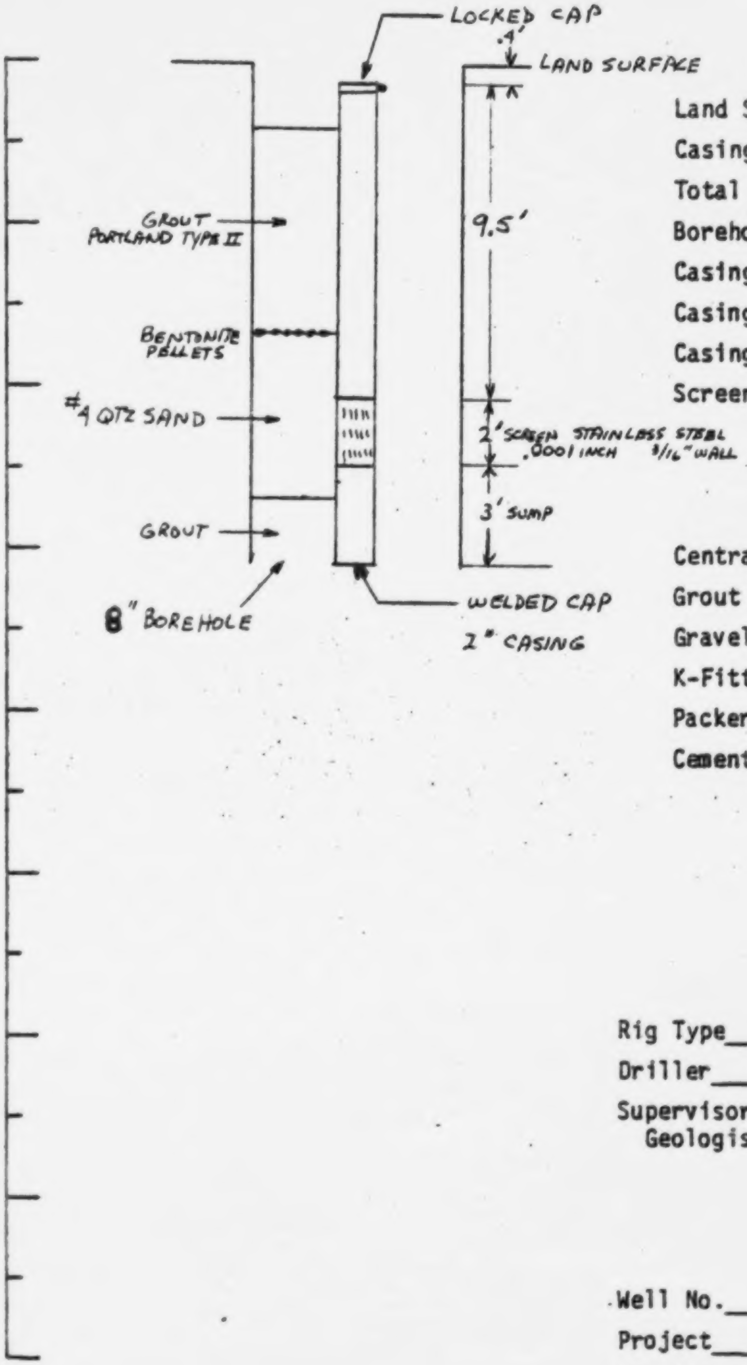
HOLE DIAMETER 8"
HOLE DEPTH 15'
CASING DIAMETER 2"ID
CASING LENGTH 14.5'
SCREEN DIAMETER 2"
SCREEN SETTING 12'-10'
SCREEN SLOT/TYPE 10 slot Johnson S.S.
.0001"

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 9/4/80
PUMPING DEPTH TO WATER no pump test yet
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S 4"
Total Depth 15'
Borehole Diameter 8"
Casing Diameter 2"
Casing Thickness 3/16"
Casing Lengths 14.5'
Screen Data
  Material Stainless steel
  Diameter 2"
  Slot Openings .0001
  Seitings 10'-12'
Centralizers
Grout Type Portland Type II
Gravel Pack #4 Quartz Sand
K-Fittings
Packers
Cement Baskets

Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Dennis T. Stanczuk

Well No. 9-A
Project Love Canal
Location W. Pasadena Ave. opposite Brookside Dr.

Date 9/3/80

Prepared By: Dennis Stanczuk
Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
0	
	YELLOWISH BROWN SILTY LOAM
4'	
	GRAY SILTY CLAY
8'	
	REDDISH GRAY SILTY CLAY
9'	
	REDDISH GRAY SILTY CLAYEY TILL PEBBLES
11'	
	REDDISH GRAY SILTY CLAYEY TILL MOIST
14'	
	REDDISH GRAY SILTY CLAYEY TILL LESS MOIST
15'	
	REDDISH GRAY SILTY CLAYEY TILL PEBBLES
18'	
	DOLOMITIC GRAVEL
20'	
	DARK AND LIGHT GRAY DOLOMITIC SAND
25'	
	DOLOMITE

PROJECT Love Canal

OWNER Elmen Wilcox

WELL NO. 9A-2

LOCATION NW corner of intersection of Pasadena Ave and Brookside Dr.

	Date	Time
DRILLING STARTED	9/4/80	09:00
DRILLING COMPLETED	9/5/80	10:45

DRILLER Pat Parmentier

GEOLOGIST Dennis Stanczuk

RIG TYPE Mobile B-56

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed

TOPO POSITION flood plain

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 18-25

WELL DATA

HOLE DIAMETER 8" auger 2 15/16 core

HOLE DEPTH 25'

CASING DIAMETER 2"

CASING LENGTH 23.3'

SCREEN DIAMETER 2"

SCREEN SETTING 18'-20'

SCREEN SLOT/TYPE 10 Slot Johnson SS

PUMP TEST DATA

STATIC DEPTH TO WATER 23.25' almost dry

DATE MEASURED 9/4/80

PUMPING DEPTH TO WATER no pump test yet

TEST DURATION

PUMPING RATE

TEST DATE

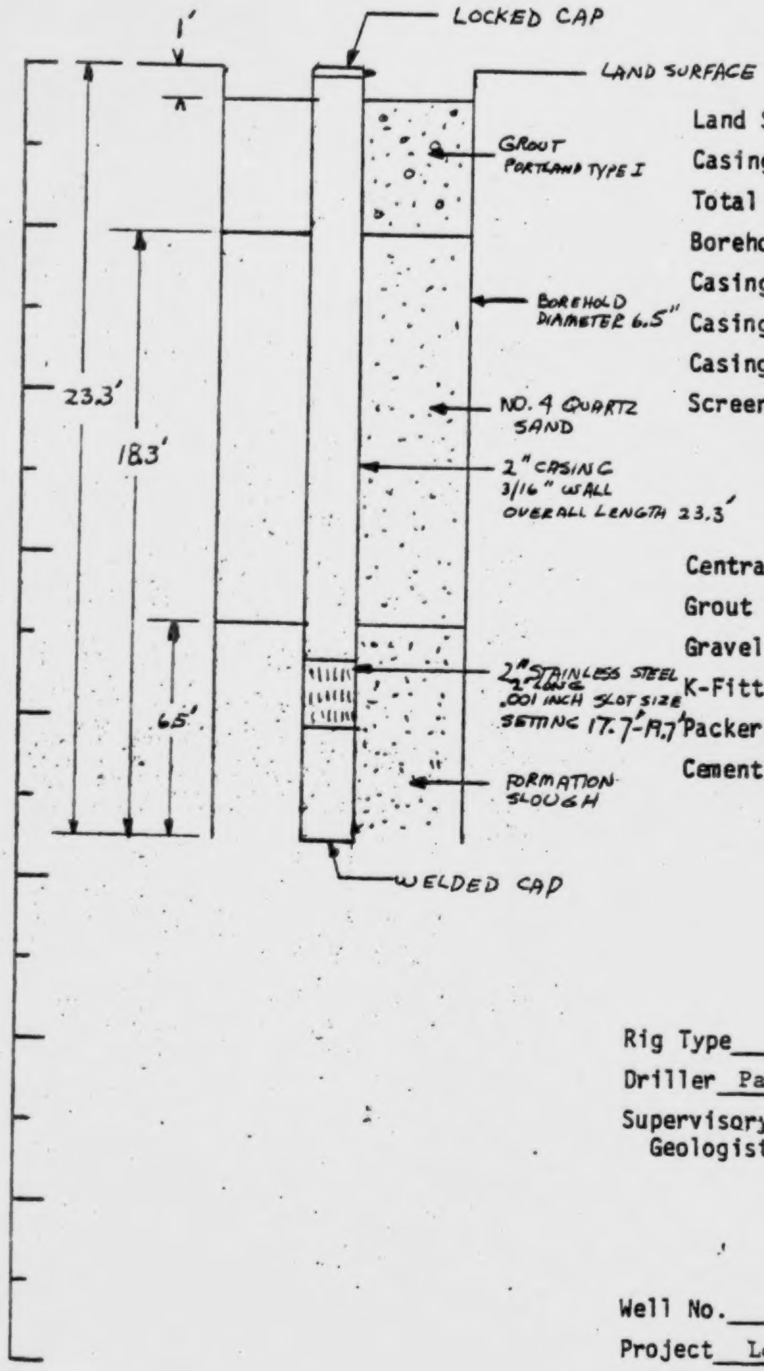
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Dennis Stanczuk

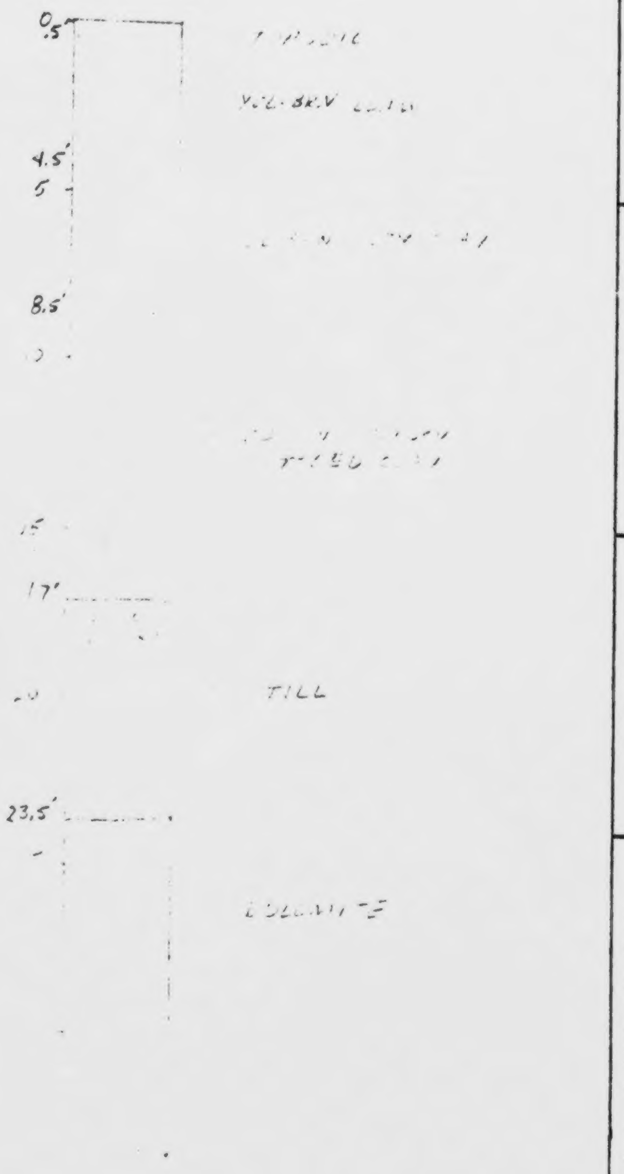
Well No. 9A-2
Project Love Canal
Location NW corner of intersection of Pasadena Ave. & Brookside Dr.

Prepared By: Dennis Stanczuk
Scale: 1"=5'

Date 9/5/80

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER Elmen Wilcox

WELL NO. 9-B

LOCATION W. Pasadena Ave., opposite Brookside Dr.

	Date	Time
DRILLING STARTED	10/7/80	0918
DRILLING COMPLETED	10/10/80	1541

DRILLER Roger Logel

GEOLOGIST Dave Conover

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 573.4

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 74,75,81

WELL DATA

HOLE DIAMETER 6", 3"

HOLE DEPTH 29.5', (not measured)

CASING DIAMETER 4"

CASING LENGTH 24.2'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A .0001"

DEPTH TO BEDROCK 23.5'

PUMP TEST DATA

STATIC DEPTH TO WATER not measured

DATE MEASURED

PUMPING DEPTH TO WATER not pumped

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

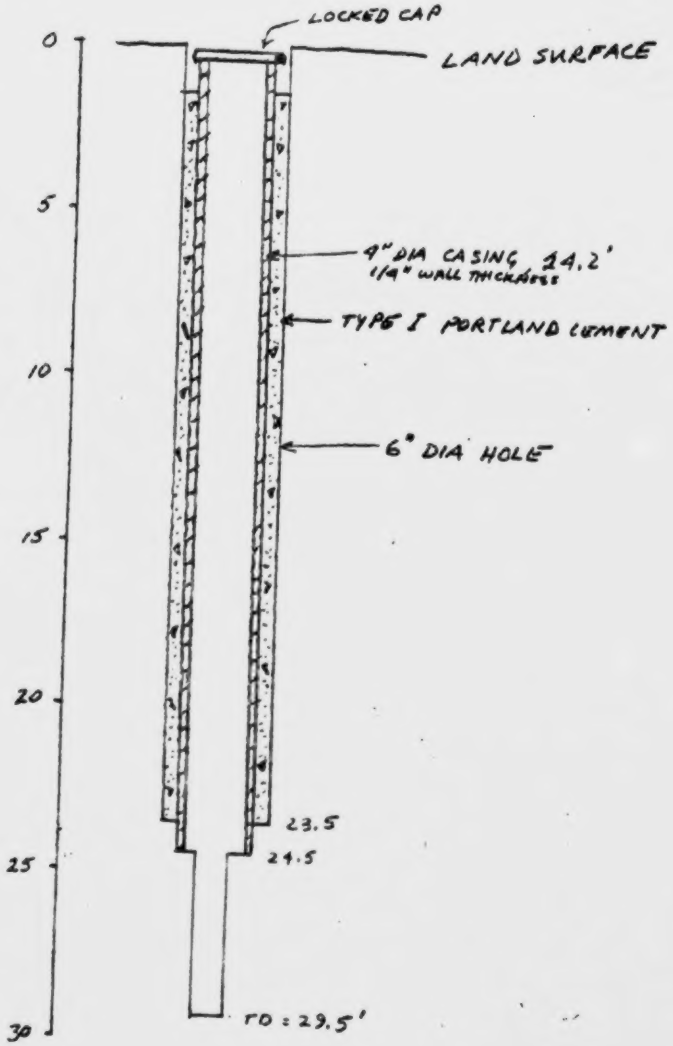
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Well labeled 9-D on drillers log

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist Dave Conover

Well No. 9-B

Project Love Canal

Location Pasadena Ave. opposite Brookside Dr.

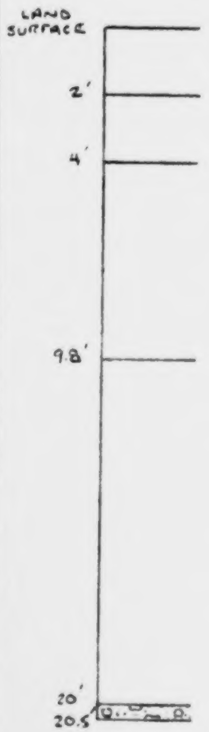
Date 10/10/80

Prepared By: Dave Conover

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



DARK BROWN LOAM DRY

LIGHT BROWN TO BROWN SILTY CLAY, MOIST

GRAY TO DARK GRAY CLAY, MOIST, STICKY

REDDISH GRAY CLAY VERY MOIST, SOFT, STICKY

GLACIAL TILL

SCALE: 1in = 5 ft

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 10-A

LOCATION in swale in area behind 93rd St. school near creek

	Date	Time
DRILLING STARTED	9/6/80	9:40
DRILLING COMPLETED	9/6/80	12:10

DRILLER Joe Jensen

GEOLOGIST Charlie Kufs

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 569.5

TOPO POSITION flat lying

PROFILE BY C. Kufs

FIELD BOOK NO. 3 PAGES 22-23

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 20.5'

CASING DIAMETER 2"

CASING LENGTH 20.5'

SCREEN DIAMETER 2"

SCREEN SETTING 17.5' - 19.5'

SCREEN SLOT/TYPE Johnson 10 slot .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/6/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

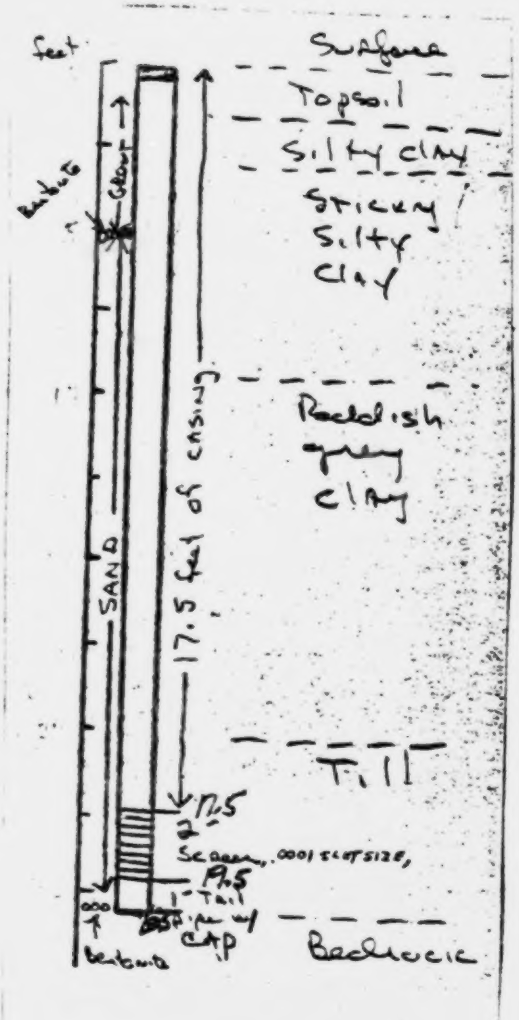
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



dry hole on
9/6/80

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
    - Material
    - Diameter
    - Slot Openings
    - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Charlie Kufs

Well No. 10A

Project Love Canal

Location in swale in area behind 93rd St. school near creek

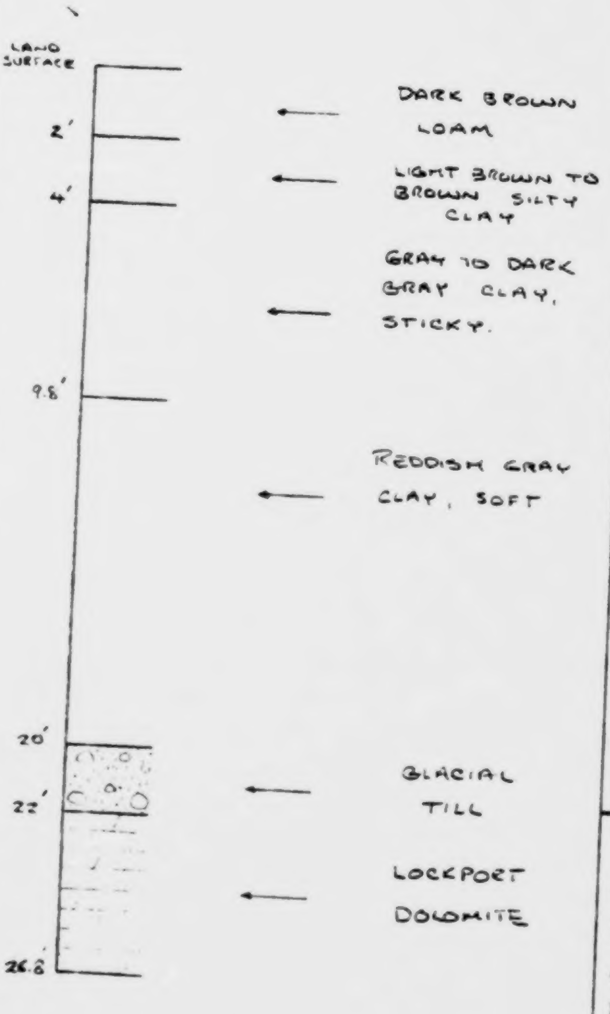
Date 9/7/80

Prepared By: C. Kufs

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



SCALE: 1 in = 5 ft

PROJECT Love Canal
OWNER City of Niagara Falls
WELL NO. 10-B
LOCATION in swale behind 93rd St. School near Bergholtz Creek

	Date	Time
DRILLING STARTED	9/5/80	11:00
DRILLING COMPLETED	9/6/80	8:45

DRILLER Joe and Leo Jensen
GEOLOGIST Charlie Kufs
RIG TYPE CME - 55
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed 569.5
TOPO POSITION flat lying
PROFILE BY C. Kufs
FIELD BOOK NO. 3 PAGES 18-22

WELL DATA

HOLE DIAMETER 6" to bedrock, 3½" in rock
HOLE DEPTH 26.8'
CASING DIAMETER 2"
CASING LENGTH 27.8'
SCREEN DIAMETER none
SCREEN SETTING -
SCREEN SLOT/TYPE - .0001"
DEPTH TO BEDROCK 22'

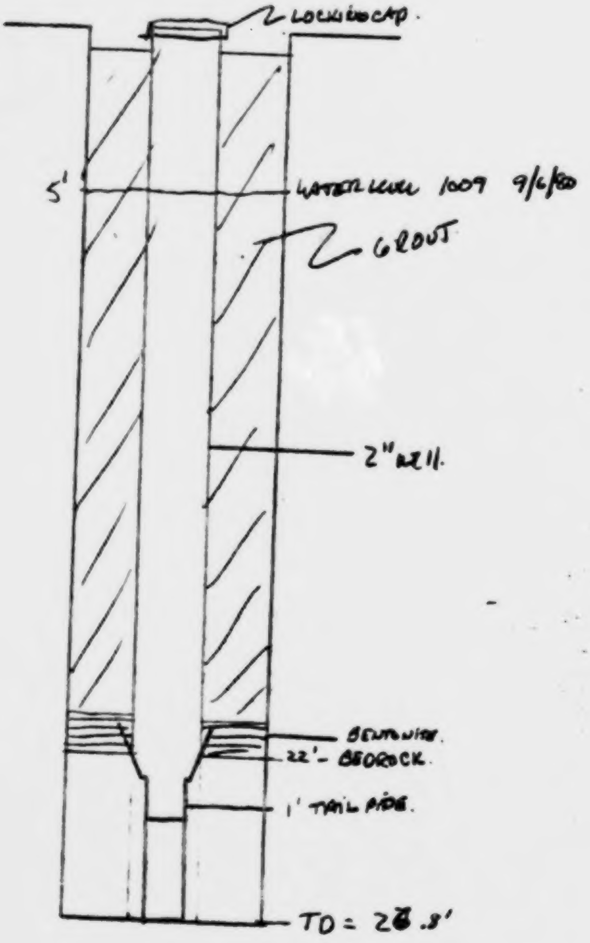
PUMP TEST DATA

STATIC DEPTH TO WATER 5' from top of casing
DATE MEASURED 9/6/80 at 10:09
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Hole is silted up. It sounded at 22.3 BLS at 7:56 on 9/6/80.

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Charlie Kufs

Well No. 10B

Project Love Canal

Location in swale behind 93rd St. school near creek

Date 9/7/80

Prepared By: C. Kufs

Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
LAND SURFACE	DARK BROWN LOAM FILL MOIST, LOOSE, FRIABLE
1.5'	DARK RED BROWN FILL SILTY CLAY LOAM, MOIST FIRM
2.5'	
3.5'	DARK GRAY BROWN AND YELLOW BROWN CLAY MOIST, FIRM YELLOW BROWN AND GRAY BROWN CLAY TO SILTY CLAY MOIST, FIRM
12.5'	PALE RED BROWN SILTY CLAY, WET, STICKY, VERY PLASTIC
16.5'	PALE RED BROWN TILL SILTY CLAYEY, GRAVELLY COBBLY, WET.
19.3'	

SCALE: 1" = 5'

PROJECT Love Canal

OWNER State of New York

WELL NO. 11-A

LOCATION 9820 Colvin Blvd. - rear yard

	Date	Time
DRILLING STARTED	9/22/80	1414
DRILLING COMPLETED	9/22/80	1522

DRILLER Joe Genovese

GEOLOGIST Phil Spooner

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 572.4

TOPO POSITION upper drainageway

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 32-33

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 19.3'

CASING DIAMETER 2"

CASING LENGTH 19.1'

SCREEN DIAMETER 2"

SCREEN SETTING 16'-18'

SCREEN SLOT/TYPE .0001 Stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/22/80 @ 1438

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

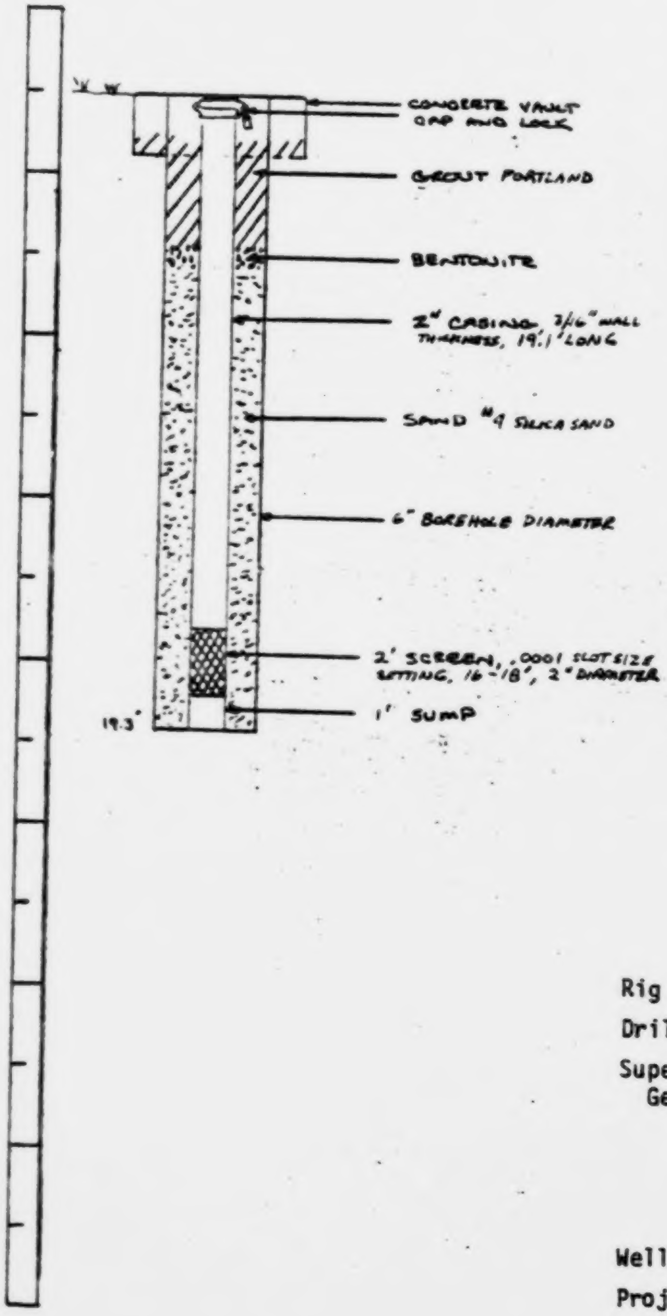
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45
Driller Joe Genovese
Supervisory Geologist Phil Spooner

Well No. 11-A
Project Love Canal
Location 9820 Colvin Blvd. - rear yard

Prepared By: Phil Spooner
Scale: 1"=5'

Date 9/22/80

WELL LOG

LAND SURFACE | PROFILE | DESCRIPTION

LAND SURFACE	DESCRIPTION
	DARK BROWN LOAM FILL MOIST, LOOSE, FRIABLE
1.5'	DARK RED BROWN FILL SILTY CLAY LOAM, MOIST FIRM
2.5'	
3.5'	DARK GRAY BROWN AND YELLOW BROWN CLAY MOIST, FIRM
	YELLOW BROWN AND GRAY BROWN CLAY TO SILTY CLAY, MOIST, FIRM
12.5'	PALE RED BROWN SILTY CLAY WET STICKY, VERY PLASTIC
16.5'	PALE RED BROWN TILL SILTY, CLAYEY GRAVELLY COBBLY, WET.
21'	RED BROWN SANDY CLAY, GRAVELLY WET, SOME WHAT PLASTIC
24'	RED BROWN GLACIAL TILL GRAVELLY COBBLY VERY WET
26'	RED BROWN SANDY CLAY, VERY WET, SOMEWHAT PLASTIC NON-STICKY
29.3	LOCKPORT DOLOMITE
38'	

SCALE: 1" = 5'

PROJECT Love Canal

OWNER State of New York

WELL NO. 11-B

LOCATION 9820 Colvin Blvd., - rear yard

	Date	Time
DRILLING STARTED	9/20/80	1110
DRILLING COMPLETED	9/25/80	1005

DRILLER Joe Genovese

GEOLOGIST Phil Spooner

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not.surveyed 572.4

TOPO POSITION upper drainageway

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 28,29,39,40

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 38.0'

CASING DIAMETER 4"

CASING LENGTH 29.6'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none .0001"

DEPTH TO BEDROCK 29.3'

PUMP TEST DATA

STATIC DEPTH TO WATER 7.05'

DATE MEASURED 9/25/80 @ 1035

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

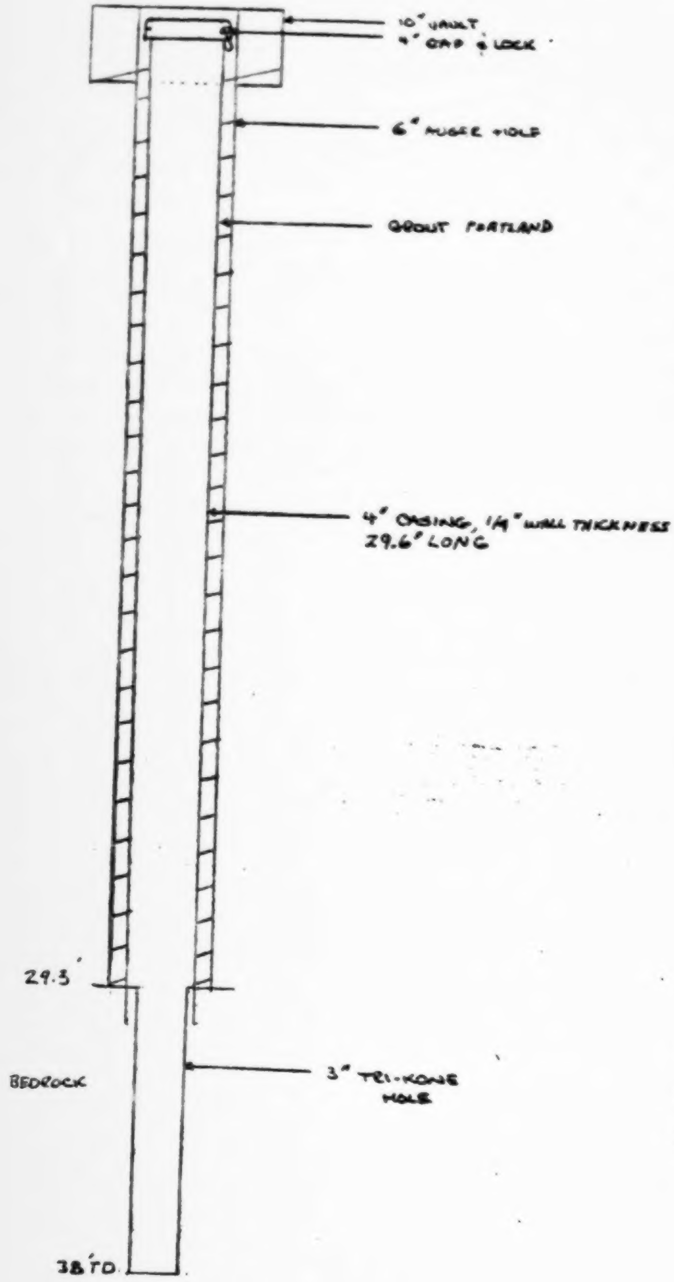
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45
Driller Joe Genovese
Supervisory Geologist Phil Spooner

Well No. 11-B
Project Love Canal
Location 9820 Colvin Blvd. - rear yard

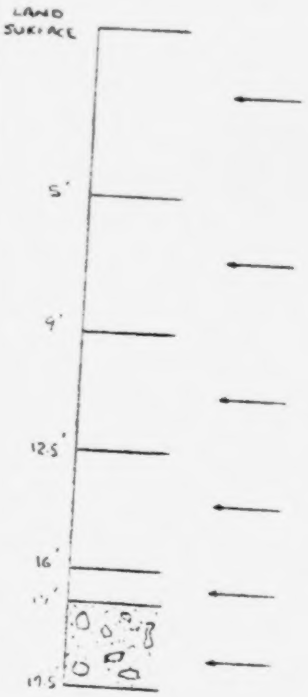
Date 9/25/80

Prepared By: Phil Spooner
Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



FILL, BROWN AND GRAY BROWN SILT TO SILT LOAM, MOIST

FILL, RED BROWN TO GRAY BROWN SILTY CLAY TO CLAY, MOIST

FILL, BROWN SILTY CLAY, BROKEN GLASS, VERY MOIST

RED BROWN AND GRAY BROWN CLAY VERY MOIST

RED BROWN AND GRAY CLAY, WET, STICKY

GLACIAL TILL

SCALE : 1in = 5ft.

PROJECT Love Canal

OWNER Richard Pittaro

WELL NO. 12-A

LOCATION 1034 99th St. at end of driveway

	Date	Time
DRILLING STARTED	9/5/80	14:30
DRILLING COMPLETED	9/5/80	17:00

DRILLER Pat Partentier

GEOLOGIST Dennis Stanczuk

RIG TYPE Mobile B-56

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 572.4

TOPO POSITION flat lying

PROFILE BY D. Stanczuk

FIELD BOOK NO. 2 PAGES 26-28

WELL DATA

HOLE DIAMETER 8"

HOLE DEPTH 19.5'

CASING DIAMETER 2"

CASING LENGTH 19'

SCREEN DIAMETER 2"

SCREEN SETTING 15' - 17'

SCREEN SLOT/TYPE 10 Slot Johnson SS .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER not measured

DATE MEASURED no pump test yet

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

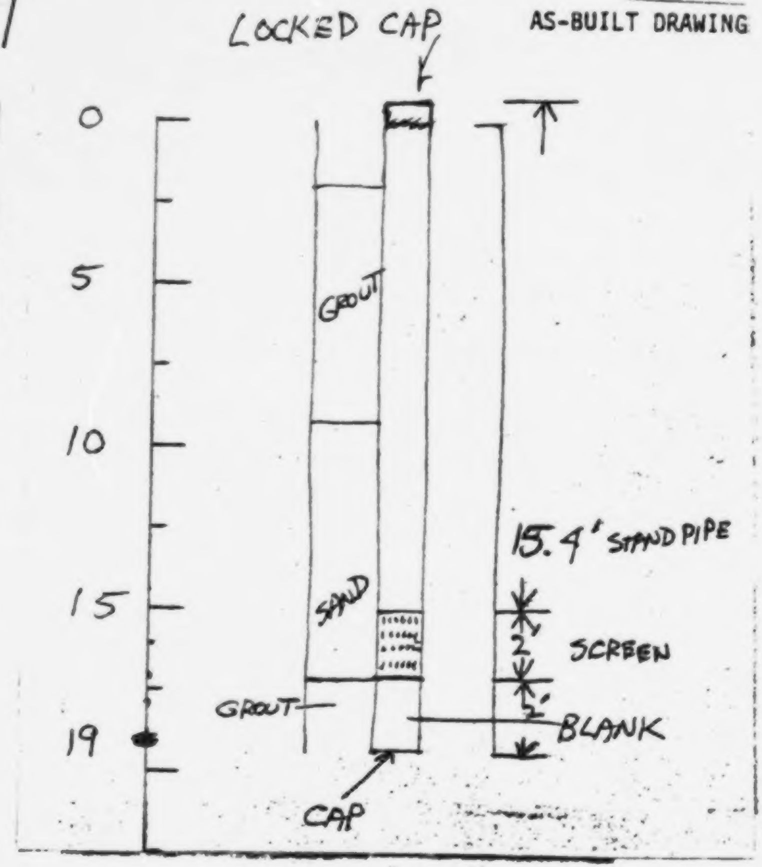
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

No B well drilled on-site.

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Mobile B-56

Driller Pat Parmentier

Supervisory Geologist Dennis Stanczuk

Well No. 12-A

Project Love Canal

Location 1034 99th St. - end of driveway

Date 9/5/80

Prepared By: Dennis Stanczuk

Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION

LAND SURFACE

STRONG BROWN SILTY CLAY LOAM SOMEWHAT MOIST

4.5'

GRAY BROWN SILTY CLAY MOIST, SOFT

13.5'

GRAY BROWN SILTY CLAY / CLAY WET, VERY SOFT

19'

GLACIAL TILL

21'

LOCKPORT DOLOMITE

SCALE: 1in = 5ft.

PROJECT Love Canal

OWNER Kenneth Burot

WELL NO. 13-A

LOCATION 1051 99th St. front yard

	Date	Time
DRILLING STARTED	9/8/80	17:00
DRILLING COMPLETED	9/8/80	18:38

DRILLER Pat Pamentier

GEOLOGIST Phil Spooner - Mitch Brodsky

RIG TYPE Mobile B-56

REFERENCE POINT Land Surface

R.P. ELEVATION Not yet surveyed 572.3

TOPO POSITION Flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 6 & 7

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 21'

CASING DIAMETER 2"

CASING LENGTH 23.1'

SCREEN DIAMETER 2"

SCREEN SETTING 17' - 22'

SCREEN SLOT/TYPE .001 Stainless

PUMP TEST DATA

STATIC DEPTH TO WATER 10.49' (3.20 m)

DATE MEASURED 9/9/80 07:40

PUMPING DEPTH TO WATER no pump test yet

TEST DURATION

PUMPING RATE

TEST DATE

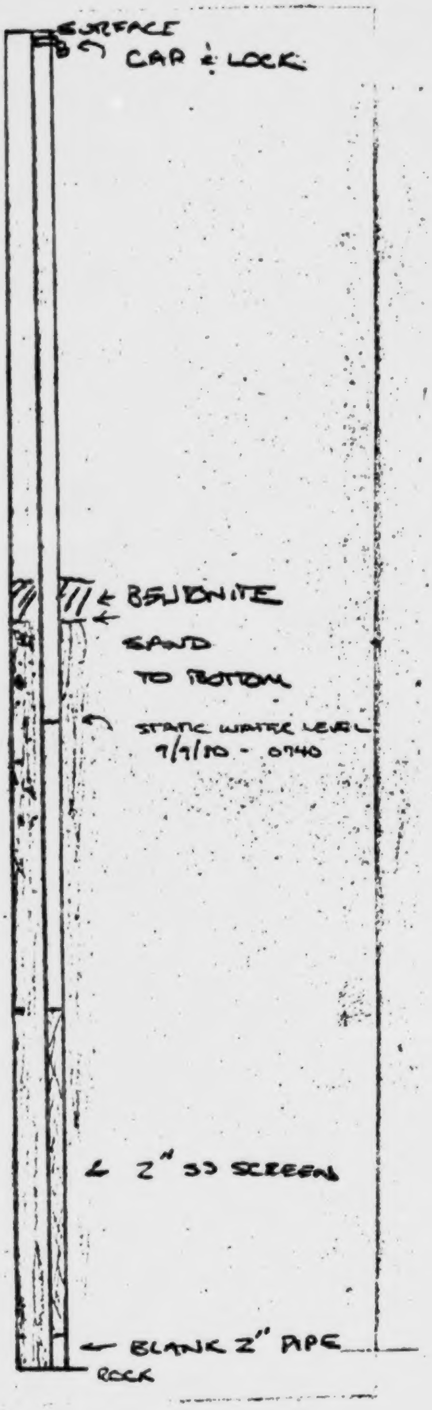
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Mitch Brodsky
Phil Spooner

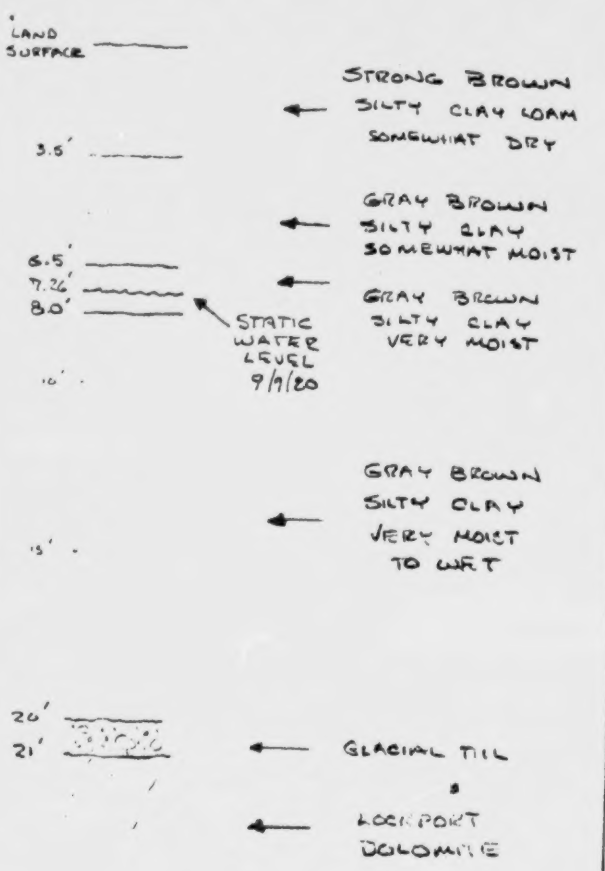
Well No. 13-A
Project Love Canal
Location 1051 99th St. front yard

Date 9/8/80

Prepared By: Phil Spooner
Scale: 1cm=1'

WELL LOG

PROFILE DESCRIPTION


LAND SURFACE
STRONG BROWN SILTY CLAY LOAM SOMEWHAT DRY
3.5'
GRAY BROWN SILTY CLAY SOMEWHAT MOIST
6.5'
7.26'
8.0'
STATIC WATER LEVEL 9/9/80
GRAY BROWN SILTY CLAY VERY MOIST
10'
GRAY BROWN SILTY CLAY VERY MOIST TO WET
15'
20'
21'
GLACIAL TILL
LOCKPORT DOLOMITE

SCALE: 1in = 5ft.

PROJECT Love Canal

OWNER Kenneth Burot

WELL NO. 13-B

LOCATION 1051 99th St. Front yard

	Date	Time
DRILLING STARTED	9/8/80	11:10
DRILLING COMPLETED	9/9/80	17:00

DRILLER Pat Pamentier

GEOLOGIST Phil Spooner

RIG TYPE Mobile B-56

REFERENCE POINT land surface

R.P. ELEVATION not surveyed yet 572.3

TOPO POSITION flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 4-10

WELL DATA

HOLE DIAMETER	6"	3"
HOLE DEPTH	to 21'	to 26'

CASING DIAMETER 2"

CASING LENGTH 21.05' + 1.33' EXTENSION

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none .0001"

DEPTH TO BEDROCK 21.0'

PUMP TEST DATA

STATIC DEPTH TO WATER 0.8 m (2.62')

DATE MEASURED 9/10/80 - 09:05

PUMPING DEPTH TO WATER no pump test done

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

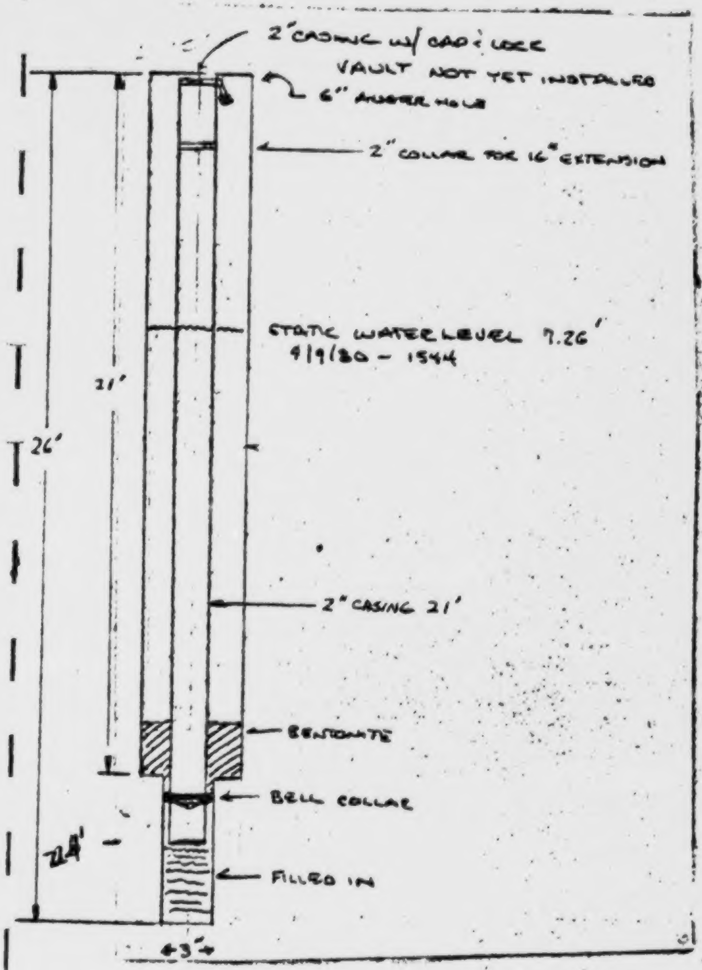
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

2" casing sunk farther into rock than expected so extension was added to top (16")

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Mobile B-56

Driller Pat Parmentier

Supervisory Geologist Phil Spooner

Well No. 13-B

Project Love Canal

Location 1051 99th St. - front yard

Date 9/9/80

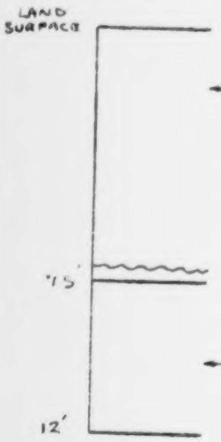
Prepared By: Phil Spooner

Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN TO BROWN SILTY CLAY LOAM, MOIST, FIRM, FILL

RED BROWN AND GRAY BROWN SILTY CLAY, VERY MOIST, PLASTIC

SCALE: 1" = 5'

PROJECT Love Canal

OWNER Russell W. Defrancisco

WELL NO. 14-A

LOCATION 1078 101st St. - front yard

	Date	Time
DRILLING STARTED	9/11/80	0700
DRILLING COMPLETED	9/11/80	0926

DRILLER Pat Parmentier

GEOLOGIST Mitch Brodsky

RIG TYPE Mobile B-56

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 572.8

TOPO POSITION flat lying

PROFILE BY Mitch Brodsky

FIELD BOOK NO. 5 PAGES 3-13

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 12'

CASING DIAMETER 2"

CASING LENGTH 12'

SCREEN DIAMETER 2"

SCREEN SETTING 7'-12' capped

SCREEN SLOT/TYPE .0001" stainless steel
.0001

PUMP TEST DATA

STATIC DEPTH TO WATER 7.08'

DATE MEASURED 9/12/80 @ 0900

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

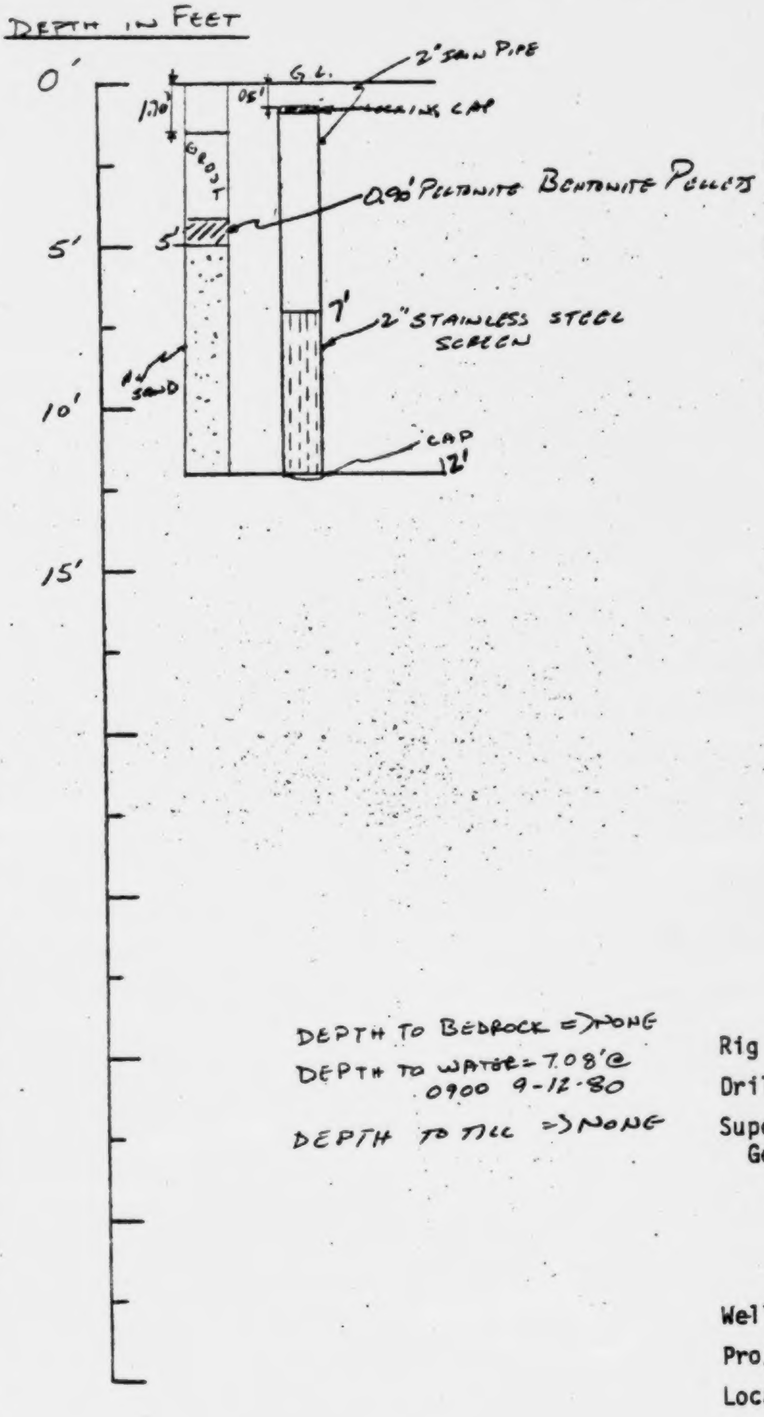
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



DEPTH TO BEDROCK => NONE
DEPTH TO WATER = 7.08' @ 0900 9-12-80
DEPTH TO TILL => NONE

CHECKLIST

Land Surface Elevation
Casing Height Above L-S 0.5'
Total Depth 12.0'
Borehole Diameter 6"
Casing Diameter 2"
Casing Thickness 3/16"
Casing Lengths 11.5'
Screen Data
  Material Stainless Steel
  Diameter 2"
  Slot Openings .0001"
  Seitings 7' to 12'
Centralizers none
Grout Type Huron Type X Portland Cement
Gravel Pack None
K-Fittings None
Packers None
Cement Baskets None

Rig Type Mobile B-56
Driller Pat Pammentier
Supervisory Geologist Mitch Brodsky

Well No. 14-A
Project Love Canal
Location 1078 101st St.

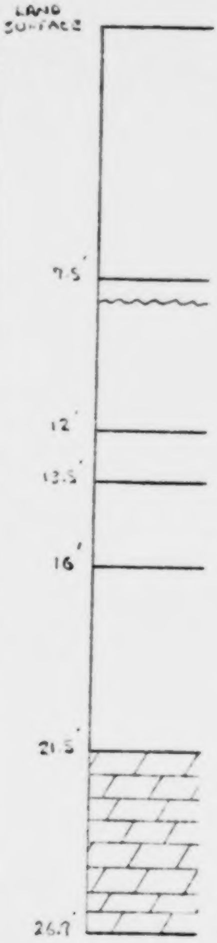
Prepared By: Mitch Brodsky
Scale: 1"=5'

Date 9/12/80

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN TO BROWN SILTY CLAY LOAM, MOIST, FIRM, FILL

RED BROWN AND GRAY BROWN SILTY CLAY, VERY MOIST PLASTIC

DARK GRAY BROWN SILTY CLAY TO CLAY, VERY MOIST TO WET, PLASTIC STICKY

BROWN SANDY CLAY LOAM, WET, FIRM, MUCH GRAVEL

GRAY BROWN AND RED BROWN SILTY CLAY, WET, MUCH GRAVEL, FIRM, COBBLES

LOCKPORT DOLOMITE

SCALE: 1" = 5'

PROJECT Love Canal
OWNER Russell W. DeFrancisco
WELL NO. 14-B
LOCATION 1078 101st St. - front yard

	Date	Time
DRILLING STARTED	9/10/80	1410
DRILLING COMPLETED	9/12/80	1700

DRILLER Pat Parmentier
GEOLOGIST Mitch Brodsky
RIG TYPE Mobile B-56
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed 572.8
TOPO POSITION flat lying
PROFILE BY Mitch Brodsky
FIELD BOOK NO. 5 PAGES 3-13

WELL DATA

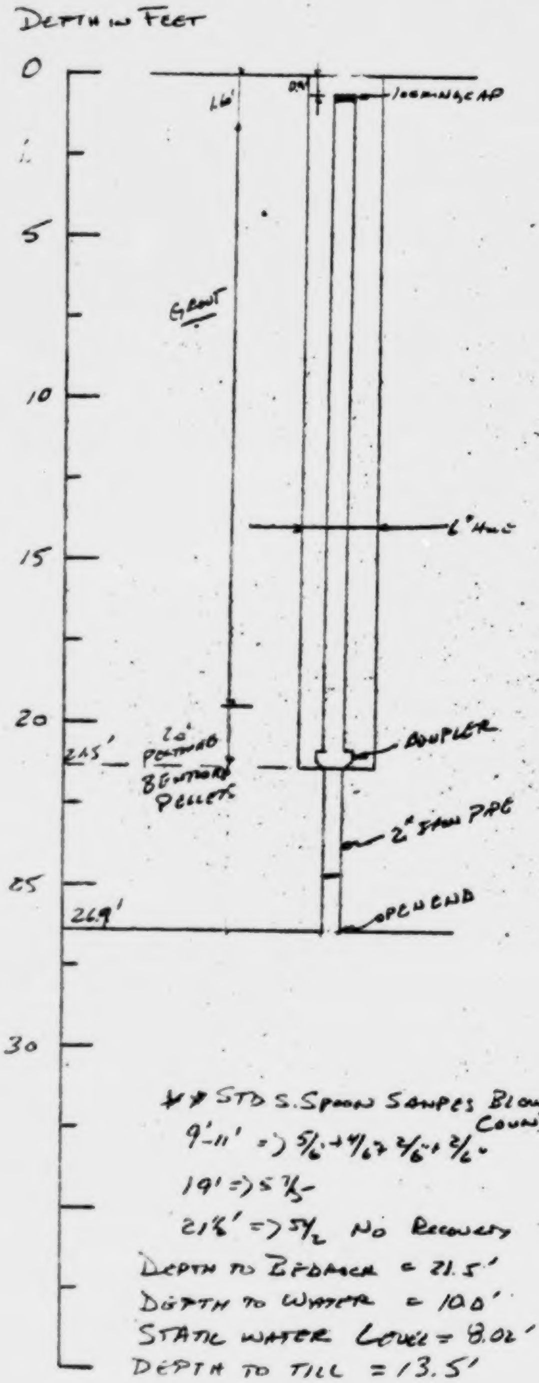
HOLE DIAMETER 6"
HOLE DEPTH 26.9'
CASING DIAMETER 6"
CASING LENGTH 21.5' + 2' pipe
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A .0001"
DEPTH TO BEDROCK 21.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 8.12'
DATE MEASURED 9/10/80 @ 1649
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



** STD S.Spoon Samples Blow(N) Counts
9'-11' => 5/6" + 4/6" + 2/6" + 2/6"
19' => 5 7/5
21½' => 5/2 No Recovery
Depth to Bedrock = 21.5'
Depth to Water = 10.0'
Static Water Level = 8.02'
Depth to Till = 13.5'

CHECKLIST

Land Surface Elevation
Casing Height Above L-S 0.9'
Total Depth 26.9'
Borehole Diameter 6"
Casing Diameter 2"
Casing Thickness 3/16"
Casing Lengths 23.5'
Screen Data NONE
Material
Diameter
Slot Openings
Seitings
Centralizers NONE
Grout Type Huron TypeII Portland cement + 10% Bentonite
Gravel Pack NONE
K-Fittings NONE
Packers NONE
Cement Baskets NONE

Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Mitch Brodsky

Well No. 14-B
Project Love Canal
Location 1078 101st St.

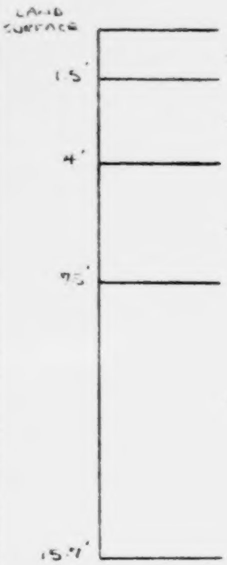
Prepared By: Mitch Brodsky
Scale: 1"=5'

Date 9/12/80

WELL LOG

PROFILE

DESCRIPTION



DARK GRAY BROWN SILT LOAM, MOIST, FIRM

BROWN AND YELLOW BROWN SILT LOAM MOIST, FIRM

STRONG BROWN SILTY CLAY TO CLAY, MOIST, PLASTIC

L BROWN AND BROWN CLAY TO SILTY CLAY WET, VERY PLASTIC, VERY STICKY

SCALE: 1" = 5'

PROJECT Love Canal
OWNER Harold E. Woodcock
WELL NO. 15-A
LOCATION 9828 Moschel St. - east lawn

	Date	Time
DRILLING STARTED	9/16/80	1645
DRILLING COMPLETED	9/16/80	1748

DRILLER Pat Parmentier
GEOLOGIST Mitch Brodsky
RIG TYPE Mobile B-56
REFERENCE POINT land surface
R.P. ELEVATION ~~not yet surveyed~~ 573.4
TOPO POSITION flat lying
PROFILE BY Mitch Brodsky
FIELD BOOK NO. 5 PAGES 13-23

WELL DATA

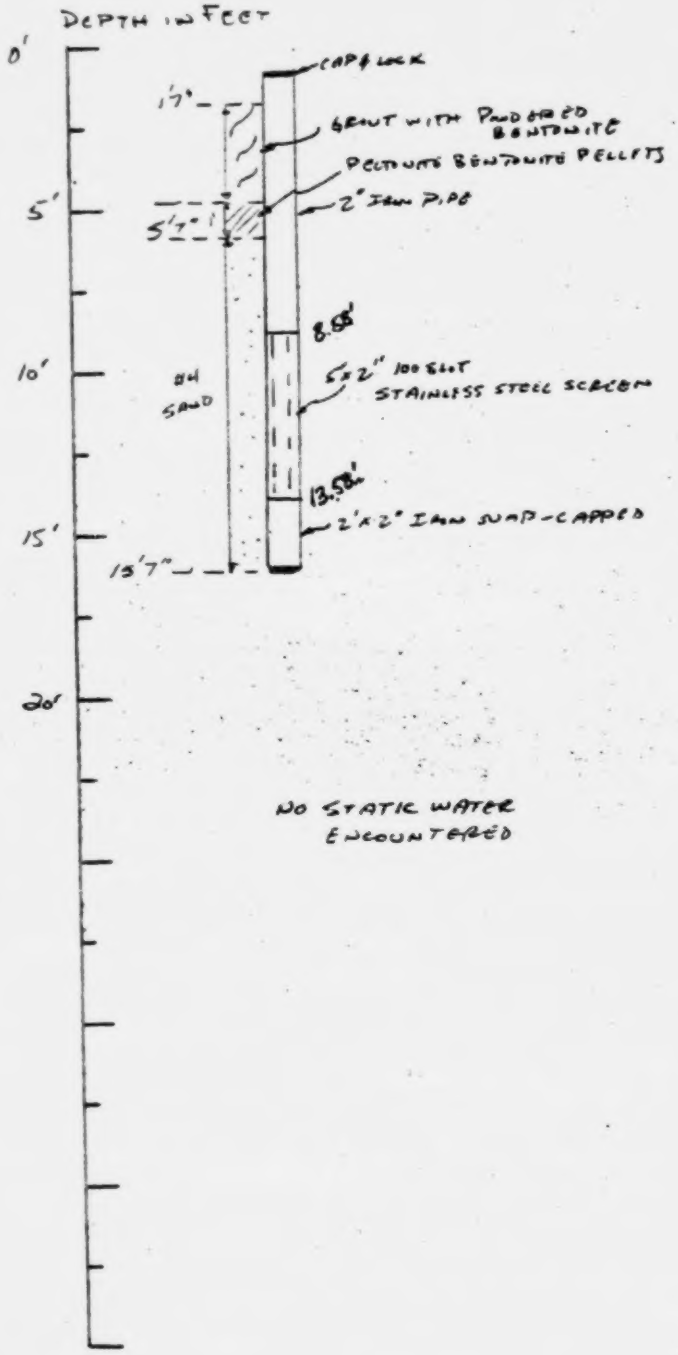
HOLE DIAMETER 6"
HOLE DEPTH 15.58'
CASING DIAMETER 2"
CASING LENGTH 15.5'
SCREEN DIAMETER 2"
SCREEN SETTING 8.58'-13.58'
SCREEN SLOT/TYPE .001 slot stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 9/16/80
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



NO STATIC WATER ENCOUNTERED

CHECKLIST

Land Surface Elevation

Casing Height Above L-S 7"

Total Depth 15'7"

Borehole Diameter 6"

Casing Diameter 2"

Casing Thickness 3/16"

Casing Lengths 15'

Screen Data

- Material Stainless Steel
- Diameter 2"
- Slot Openings 100
- Seitings 8'7"-13'7"

Centralizers -

Grout Type Huron Type I Portland Cement

Gravel Pack - none

K-Fittings none

Packers none

Cement Baskets none

Rig Type Mobile B-56

Driller Pat Parmentier

Supervisory Geologist Mitch Brodsky

Well No. 15-A

Project Love Canal

Location East lawn of property
9828 Moschel St.

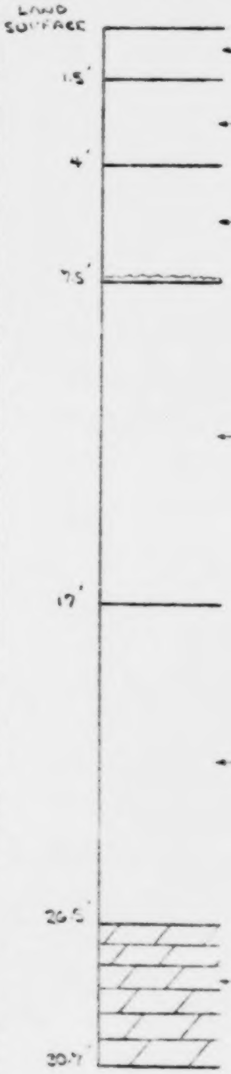
Date 9-16-80

Prepared By: Mitch Brodsky

Scale: 1"=5'

WELL LOG

PROFILE



DESCRIPTION

DARK GRAY BROWN SILT LOAM, MOIST, FIRM

BROWN AND YELLOW BROWN, SILT LOAM, MOIST, FIRM

STRONG BROWN SILTY CLAY TO CLAY, MOIST, PLASTIC

RED BROWN AND BROWN CLAY TO SILTY CLAY, WET, VERY PLASTIC, VERY STICKY

RED BROWN AND BROWN SILTY CLAY, WET, MUCH GRAVEL, FEW COBBLES

LOCKPORT DOLOMITE

SCALE: 1" = 5'

PROJECT Love Canal

OWNER Harold E. Woodcock

WELL NO. 15-B

LOCATION 9828 Moschel St. - east lawn

	Date	Time
DRILLING STARTED	9/13/80	0727
DRILLING COMPLETED	9/16/80	2030

DRILLER Pat Parmentier

GEOLOGIST Mitch Brodsky

RIG TYPE Mobile B-56

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 573.4

TOPO POSITION Flat lying

PROFILE BY Mitch Brodsky

FIELD BOOK NO. 5 PAGES 13-23

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 30.7'

CASING DIAMETER 2"

CASING LENGTH 26.5'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A .0001"

DEPTH TO BEDROCK 26.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 7/4'

DATE MEASURED 9/17/80 @ 0810

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

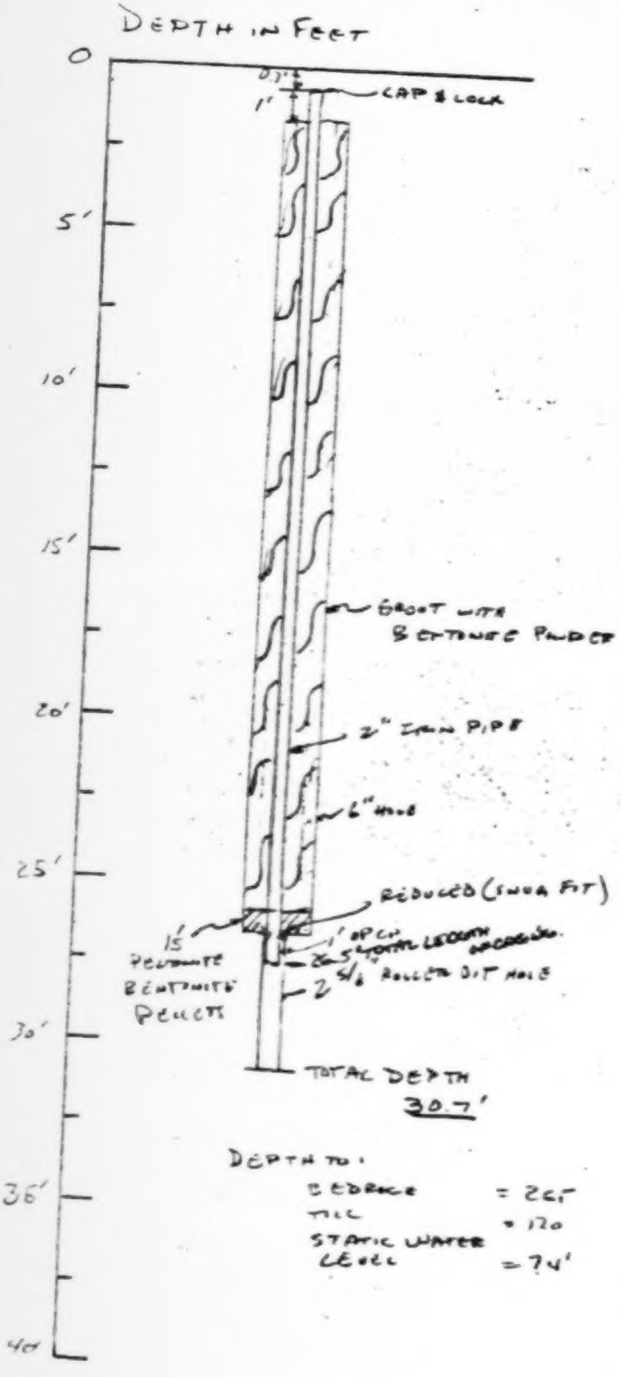
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



DEPTH TO:
BEDROCK = 26.5
TILL = 12.0
STATIC WATER LEVEL = 7.4'

CHECKLIST

Land Surface Elevation
Casing Height Above L-S .7'
Total Depth 30.7'
Borehole Diameter 6"
Casing Diameter 2"
Casing Thickness 3/16"
Casing Lengths 25.8'
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type Huron Type II Portland Cement
Gravel Pack
K-Fittings
Packers
Cement Baskets

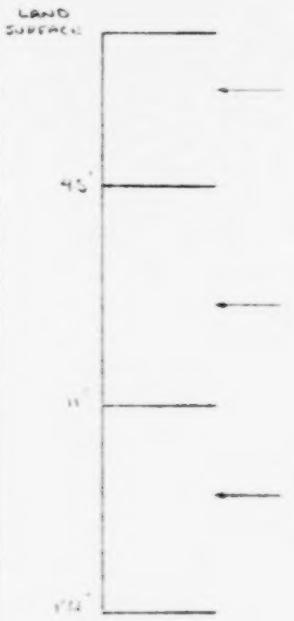
Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Mitch Brodsky

Well No. 15-B
Project Love Canal
Location 9828 Moschel St. east lawn of property
Date 9/17/80

Prepared By: Mitch Brodsky
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



PALE BROWN SILTY CLAY LOAM, MOIST, FIRM

RED BROWN SILTY CLAY MOIST, SLIGHTLY PLASTIC

RED BROWN AND GRAY BROWN SILTY CLAY TO CLAY, VERY MOIST PLASTIC, STICKY

SCALE: 1" = 5'

PROJECT Love Canal

OWNER Timothy H. Earp

WELL NO. 16-A

LOCATION 73 N. Mason Ct. - backyard, midway between house & Bergholtz Creek

	Date	Time
DRILLING STARTED	9/17/80	1602
DRILLING COMPLETED	9/17/80	1745

DRILLER Pat Parmentier

GEOLOGIST Mitch Brodsky

RIG TYPE Mobile B-56

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 572.8

TOPO POSITION flood plain

PROFILE BY Mitch Brodsky

FIELD BOOK NO. 5 PAGES 24-30

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 17.83'

CASING DIAMETER 2"

CASING LENGTH 17'

SCREEN DIAMETER 2"

SCREEN SETTING 10.83'-15.83'

SCREEN SLOT/TYPE .0001 slot/stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER 5.0'

DATE MEASURED 9/29/80 @ 0805

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

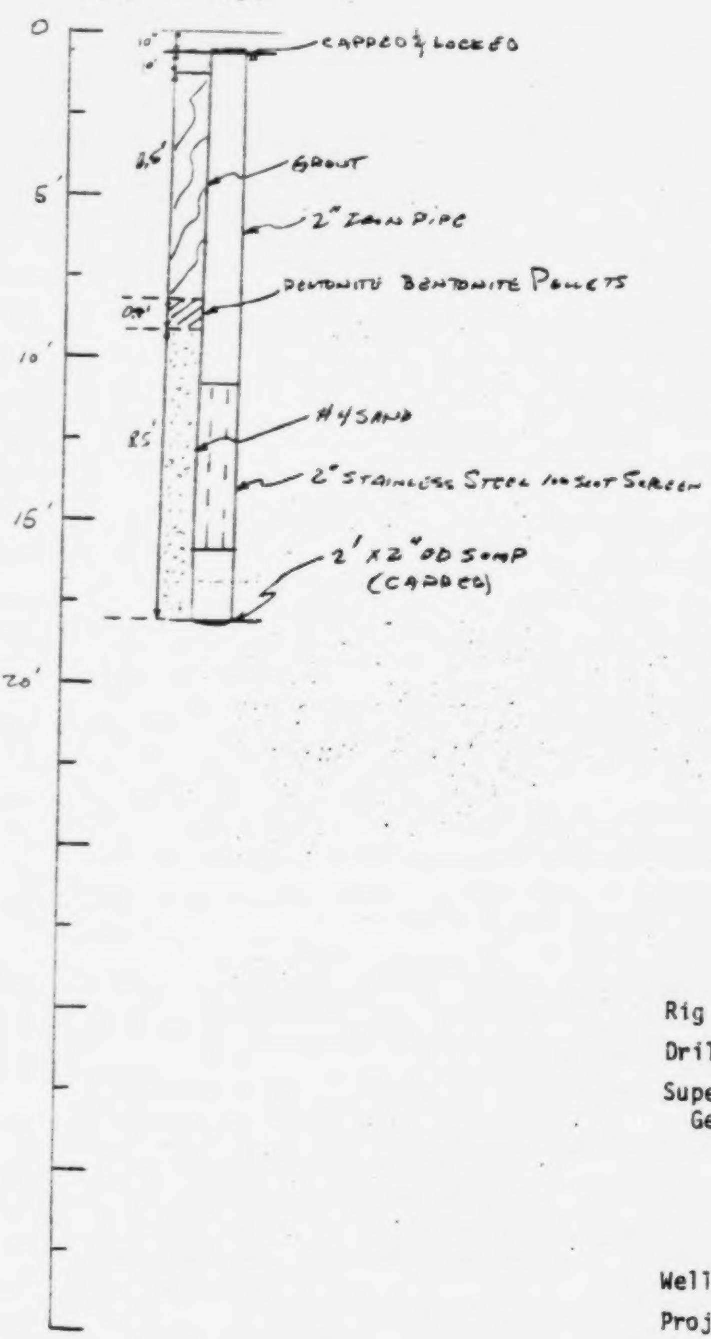
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height BELOW L-S 10"
Total Depth 17'10"
Borehole Diameter 6"
Casing Diameter 2"
Casing Thickness 3/16"
Casing Lengths 17'
Screen Data
  Material Stainless steel
  Diameter 2"
  Slot Openings 100
  Seitings 10'10"-15'10"
Centralizers
Grout Type Huron Type II Portland Cement
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Mitch Brodsky

Well No. 16-A
Project Love Canal
Location 73 N. Mason Ct.

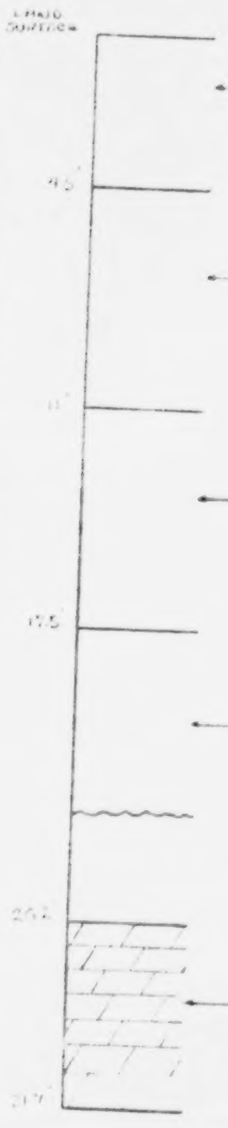
Prepared By: Mitch Brodsky
Scale: 1"=5'

Date 9/18/80

WELL LOG

PROFILE

DESCRIPTION



PALE BROWN SILTY CLAY LOAM, MOIST, FIRM

RED BROWN SILTY CLAY MOIST, SLIGHTLY PLASTIC

RED BROWN [illegible] SILTY CLAY TO CLAY, VERY MOIS. PLASTIC, STICKY

[illegible] SANDY CLAY, VERY MOIST TO WET [illegible]

LOCKPORT DOLOMITE

SCALE: 1" = 5'

PROJECT Love Canal

OWNER Timothy H. Earp

WELL NO. 16-B

LOCATION 73 N. Mason Ct. - backyard, midway between house & Bergholtz creek

	Date	Time
DRILLING STARTED	9/17/80	1635
DRILLING COMPLETED	9/18/80	1930

DRILLER Pat Parmentier/Ron Bush

GEOLOGIST Mitch Brodsky

RIG TYPE Mobile B-56 & CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 572.8

TOPO POSITION flood plain

PROFILE BY Mitch Brodsky

FIELD BOOK NO. 5 PAGES 24-30

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 31.58'

CASING DIAMETER 4"

CASING LENGTH 25.83'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A .0001"

DEPTH TO BEDROCK 26.2'

PUMP TEST DATA

STATIC DEPTH TO WATER 23'

DATE MEASURED 9/17/80 @ 1246

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

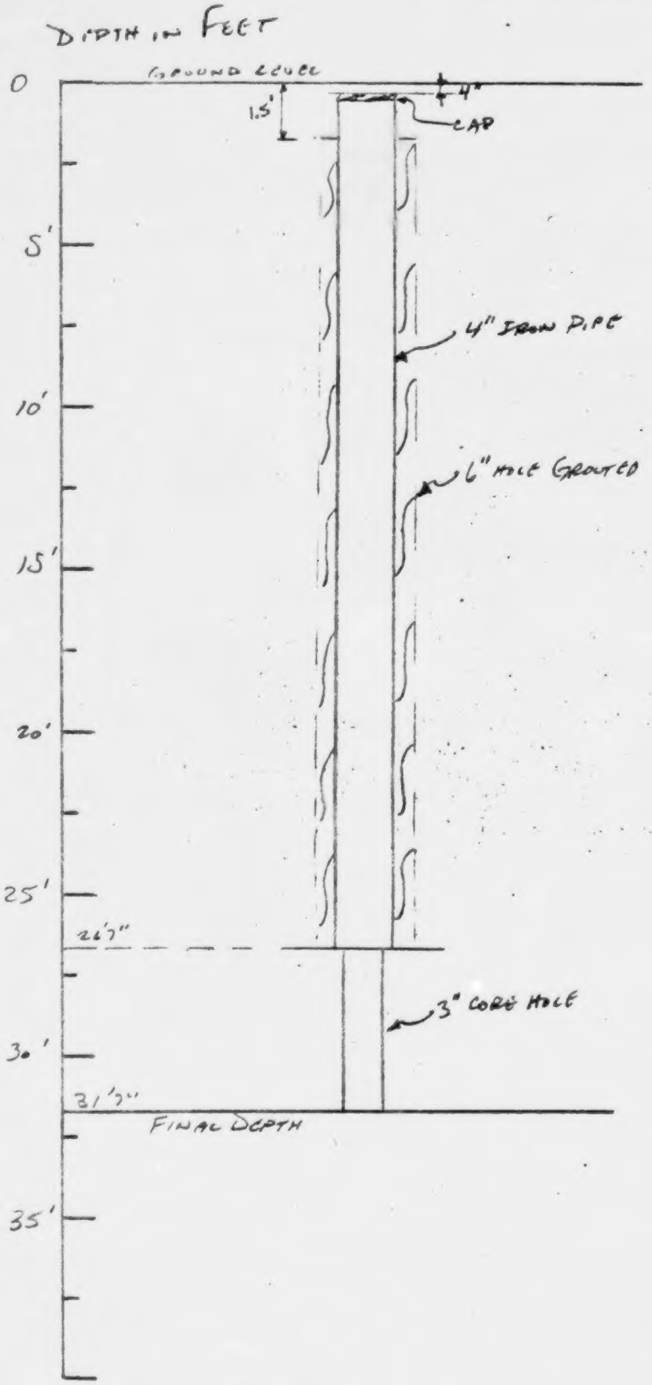
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S 4"
Total Depth 31'7"
Borehole Diameter 6"
Casing Diameter 4"
Casing Thickness 5/16"
Casing Lengths 25.8'
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type Huron TypeII Portland Cement
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55 & Mobile B-56
Driller Pat Parmentier/Ron Bush
Supervisory Geologist Mitch Brodsky

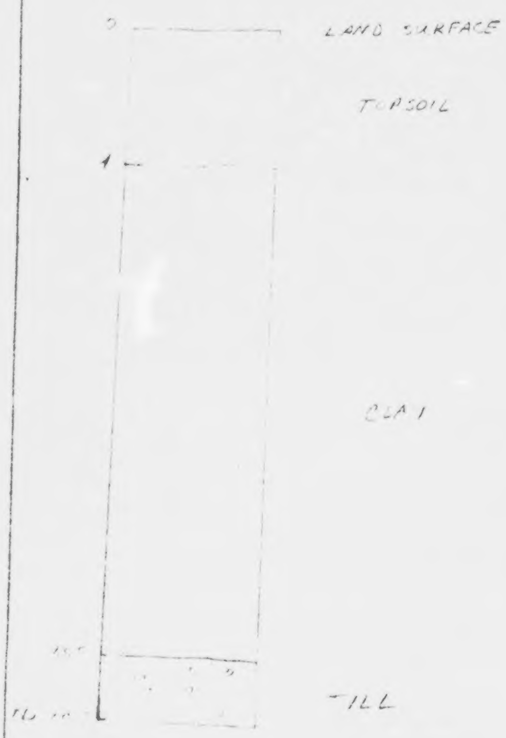
Well No. 16-B
Project Love Canal
Location 73 N. Mason Ct.-backyard

Date 9/20/80

Prepared By: Mitch Brodsky
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER Alfred Rzucidlo

WELL NO. 17-A

LOCATION 796 102nd St.
Well nearest street

	Date	Time
DRILLING STARTED	9/12/80	1605
DRILLING COMPLETED	9/13/80	1035

DRILLER Mike Warner

GEOLOGIST Dave Conover

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 572.2

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 39-41

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 20.5'

CASING DIAMETER 2"ID

CASING LENGTH 20.4'

SCREEN DIAMETER 2"

SCREEN SETTING 16.5' to 18.5'

SCREEN SLOT/TYPE Horz. slot .0001"slot,
stainless [illegible]

PUMP TEST DATA

STATIC DEPTH TO WATER Dry

DATE MEASURED 9/13/80 1037

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

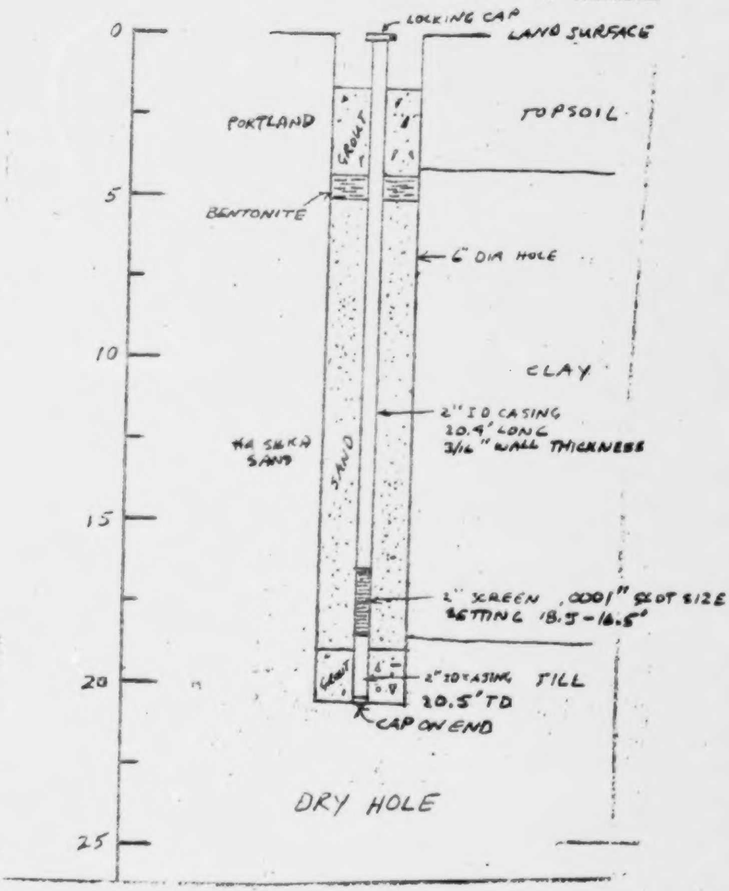
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dave Conover

Well No. 17-A

Project Love Canal

Location 796 102nd St. well nearest street

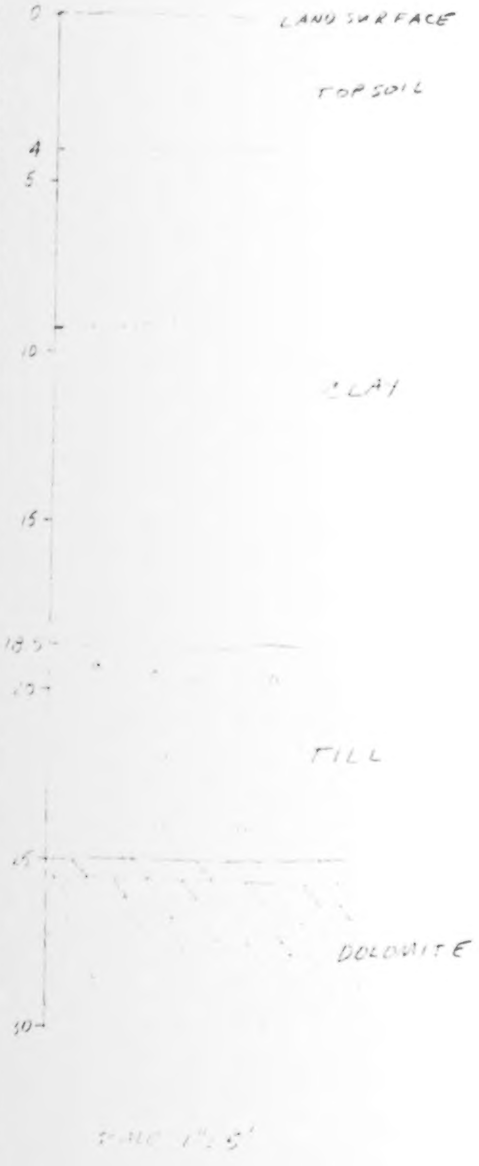
Date 9/13/80

Prepared By: Dave Conover

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER Alfred Rzucidlo

WELL NO. 17-B

LOCATION 796 102nd St.

	Date	Time
DRILLING STARTED	9/11/80	1140
DRILLING COMPLETED	9/12/80	1630

DRILLER Mike Warner

GEOLOGIST Dave Conover

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 572.2

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 32-39

WELL DATA

HOLE DIAMETER 6", 3"

HOLE DEPTH 25' of 6", 5' of 3"

CASING DIAMETER 2"ID

CASING LENGTH 27'

SCREEN DIAMETER no screen set

SCREEN SETTING

SCREEN SLOT/TYPE .0001"

DEPTH TO BEDROCK 25'

PUMP TEST DATA

STATIC DEPTH TO WATER 7.2' below top casing

DATE MEASURED 9/12/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

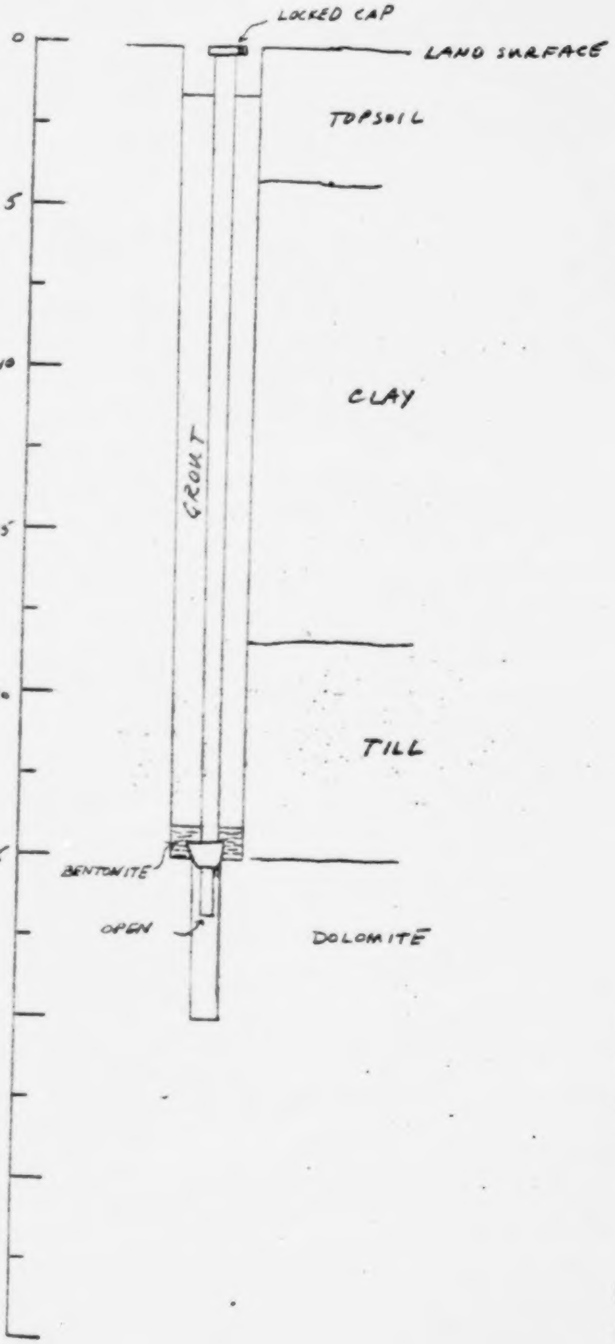
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S 0
Total Depth 30'
Borehole Diameter 6", 3"
Casing Diameter 2" ID
Casing Thickness 3/16" 3/1
Casing Lengths 25', 2'
Screen Data none used
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers none
Grout Type Portland cement, Type 1
Gravel Pack none
K-Fittings none
Packers none
Cement Baskets none

Rig Type CME-55
Driller Mike Warner
Supervisory Geologist Dave Conover

Well No. 17-B3
Project Love Canal
Location 796 102nd St.

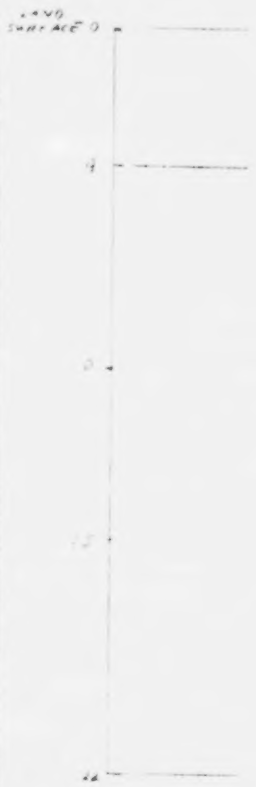
Prepared By: Dave Conover
Scale: 1"=5'

Date 9/12/80

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN AND YELLOWISH BROWN SANDY CLAY TOPSOIL

LIGHT BROWN CLAY

GRAY - BROWN CLAY

REDDISH BRN. CLAY

GRAY CLAY

TILL

SCALE 1" = 5'

PROJECT Love Canal

OWNER Samuel Davey

WELL NO. 18-A

LOCATION 756 102nd St. in yard south of house

	Date	Time
DRILLING STARTED	9/11/80	0747
DRILLING COMPLETED	9/11/80	0910

DRILLER Mike Warner

GEOLOGIST D. Conover

RIG TYPE CME 55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 573.7

TOPO POSITION flat lying

PROFILE BY D. Conover

FIELD BOOK NO. 8 PAGES 30, 31

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 22.2'

CASING DIAMETER 2" ID

CASING LENGTH 21.5'

SCREEN DIAMETER 2"

SCREEN SETTING 19.5' - 21.5'

SCREEN SLOT/TYPE vertical slot, stainless .0001" opening

PUMP TEST DATA

STATIC DEPTH TO WATER Well dry

DATE MEASURED 9/11/80 0915

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

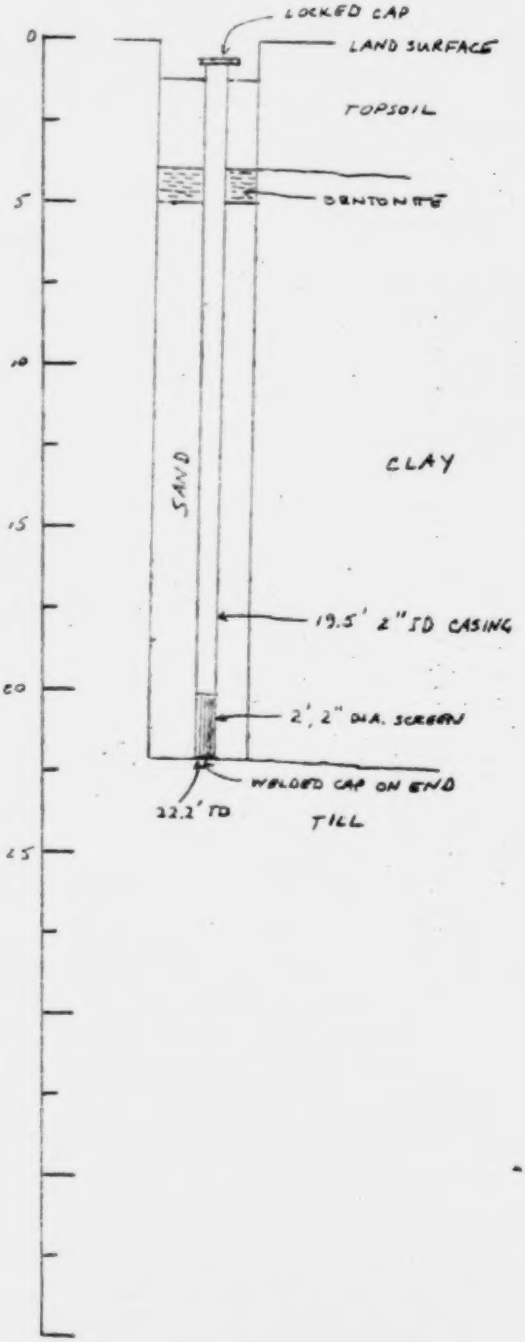
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation

Casing Height Above L-S 6"

Total Depth 22.2'

Borehole Diameter 6"

Casing Diameter 2"ID

Casing Thickness 3/16"

Casing Lengths 19.5'

Screen Data

- Material Stainless
- Diameter 2"
- Slot Openings .0001"
- Seitings 19.5 - 22.5'

Centralizers none

Grout Type Portland Type I

Gravel Pack Silica Sand #4

K-Fittings none

Packers none

Cement Baskets none

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dave Conover

Well No. 18-A

Project Love Canal

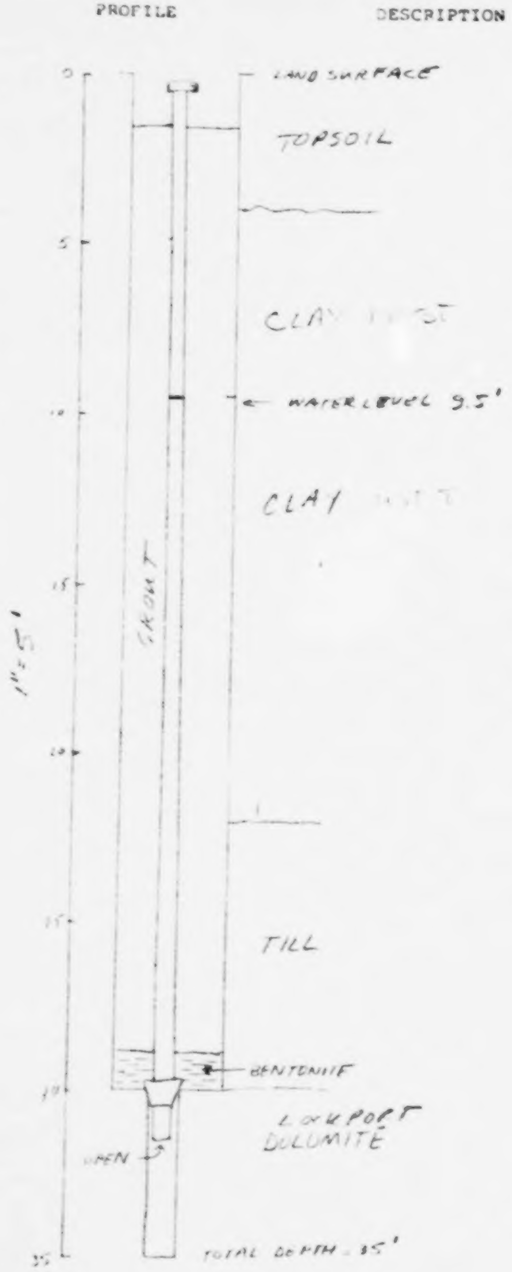
Location 756 102nd St.

Date 9/11/80

Prepared By: Dave Conover

Scale: 1"=5'

WELL LOG



PROJECT Love Canal
OWNER Unknown
WELL NO. 18-B
LOCATION 756 102nd St. in yard to south of house

	Date	Time
DRILLING STARTED	9/10/80	1004
DRILLING COMPLETED	9/10/80	1700

DRILLER Mike Warner
GEOLOGIST Dave Conover
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed 573.7
TOPO POSITION flat lying
PROFILE BY Dave Conover
FIELD BOOK NO. 8 PAGES 25-

WELL DATA

HOLE DIAMETER 6", 3"
HOLE DEPTH 30' of 6" dia., 5' of 3" dia.
CASING DIAMETER 2"ID
CASING LENGTH 29.5' with 1' tailpiece
SCREEN DIAMETER no screen used
SCREEN SETTING --
SCREEN SLOT/TYPE -- .0001"
DEPTH TO BEDROCK 30'

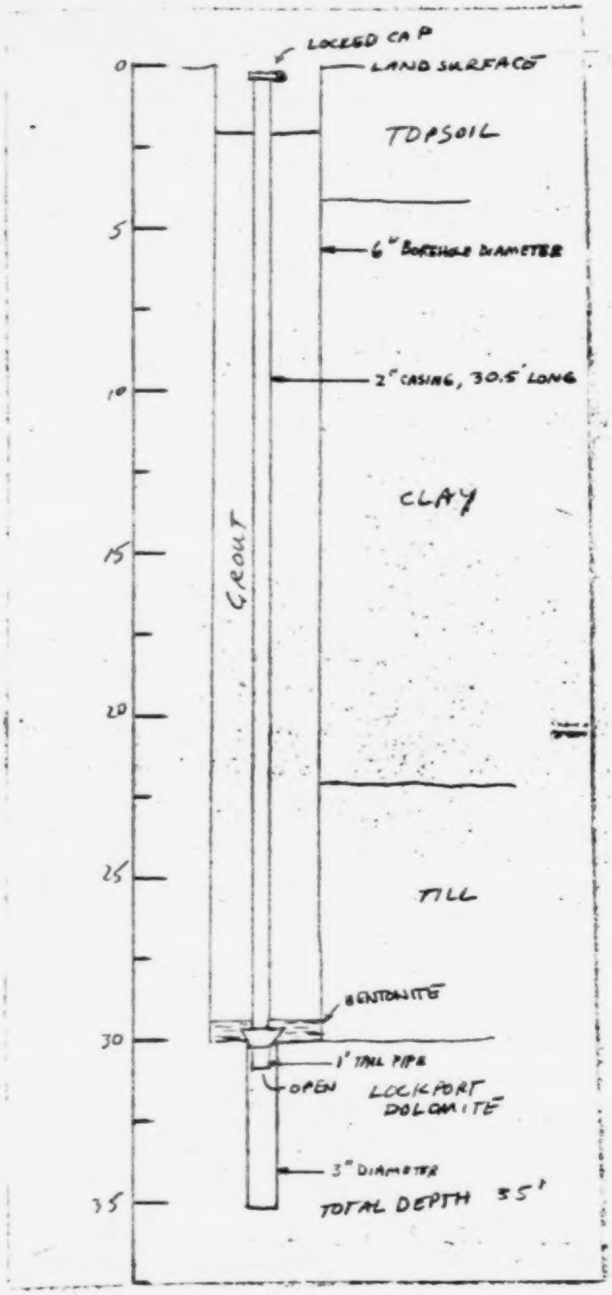
PUMP TEST DATA

STATIC DEPTH TO WATER 9.5'
DATE MEASURED 9/10/80
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Depth to top till - 22.2'
Depth to Dolomite - 30'
Grout mixture leaked down 2" casing
Well depth of 35' measured after grouting complete

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
    - Material
    - Diameter
    - Slot Openings
    - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dave Conover

Well No. 18-B

Project Love Canal

Location 756 102nd St. in yard to south of house

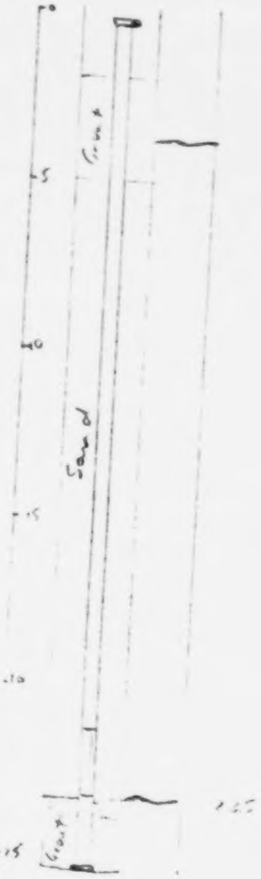
Prepared By: Dave Conover

Scale: 1"=5'

Date 9/10/80

WELL LOG

PROFILE



DESCRIPTION

topsoil
Boundary
indistinct

clay

Till

PROJECT Love Canal

OWNER Leonard C. Kreamer

WELL NO. 19-A

LOCATION Lot immediately south of 732 102nd St.

	Date	Time
DRILLING STARTED	9/9/80	14:52
DRILLING COMPLETED	9/9/80	17:30

DRILLER Mike Warner

GEOLOGIST D. Conover

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION 573.2

TOPO POSITION Flat

PROFILE BY Conover

FIELD BOOK NO. 8 PAGES 23, 24

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 25.5'

CASING DIAMETER 2" ID

CASING LENGTH 24.9'

SCREEN DIAMETER 2"

SCREEN SETTING 21.5' - 23.5'

SCREEN SLOT/TYPE vertical slot, stainless, .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER not measured

DATE MEASURED

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

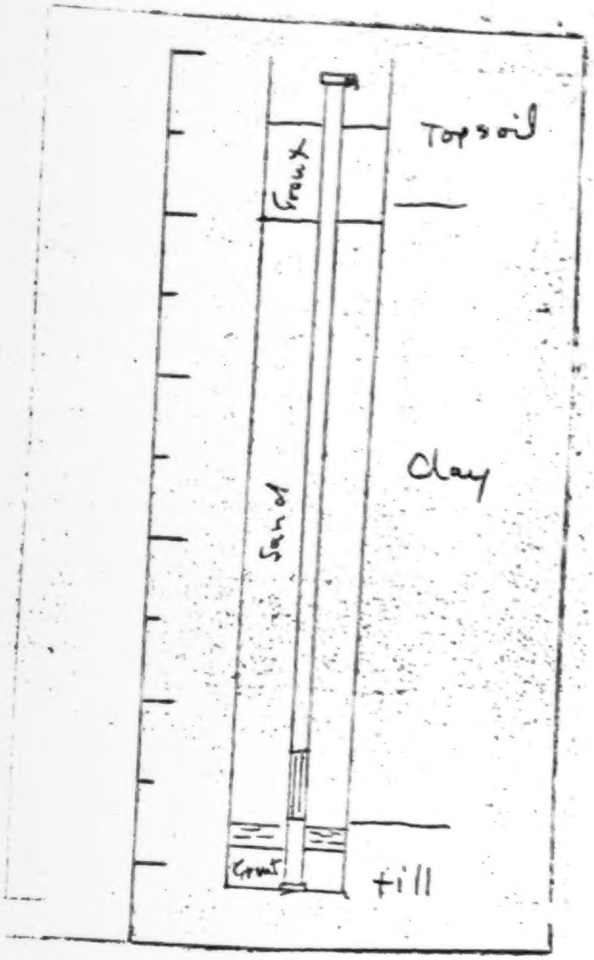
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dave Conover

Well No. 19-A

Project Love Canal

Location Lot immediately south of 732 102nd St.

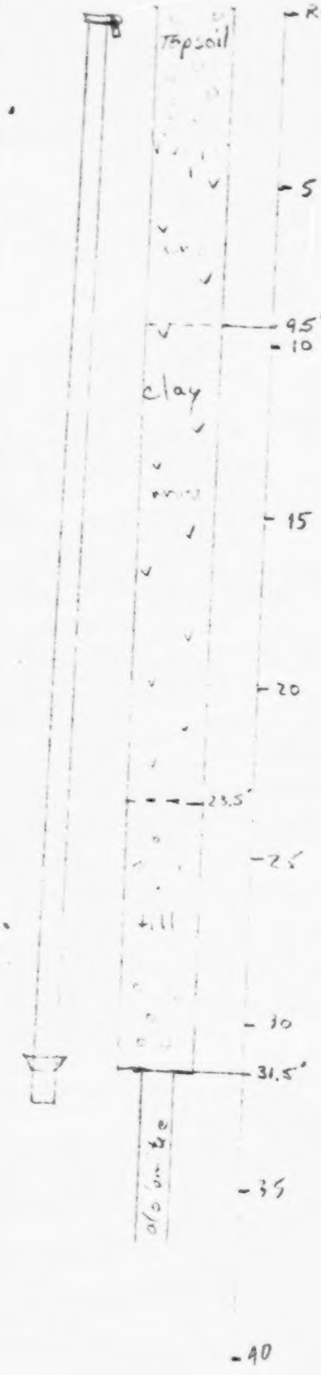
Date 9/9/80

Prepared By: Dave Conover

Scale: 1"=5'

WELL LOG

PROFILE



DESCRIPTION

No pronounced change between clay and till noticed. Drilling and casing driving more difficult at 23.5'

PROJECT Love Canal

OWNER Leonard C. Kreamer

WELL NO. 19-B

LOCATION Lot immed. south 732 102nd St.

	Date	Time
DRILLING STARTED	9/8/80	15:42
DRILLING COMPLETED	9/9/80	16:00

DRILLER Mike Warner

GEOLOGIST D. Conover

RIG TYPE CME-55

REFERENCE POINT Land surface

R.P. ELEVATION not yet surveyed 573.2

TOPO POSITION flat lying

PROFILE BY D. Conover

FIELD BOOK NO. 8 PAGES 17-23

WELL DATA

HOLE DIAMETER 6", 3"

HOLE DEPTH 31.5', 36.5'

CASING DIAMETER 2" ID

CASING LENGTH 31', 1'

SCREEN DIAMETER no screen set

SCREEN SETTING

SCREEN SLOT/TYPE .0001"

DEPTH TO BEDROCK 31.5'

PUMP TEST DATA

STATIC DEPTH TO WATER not measured

DATE MEASURED

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

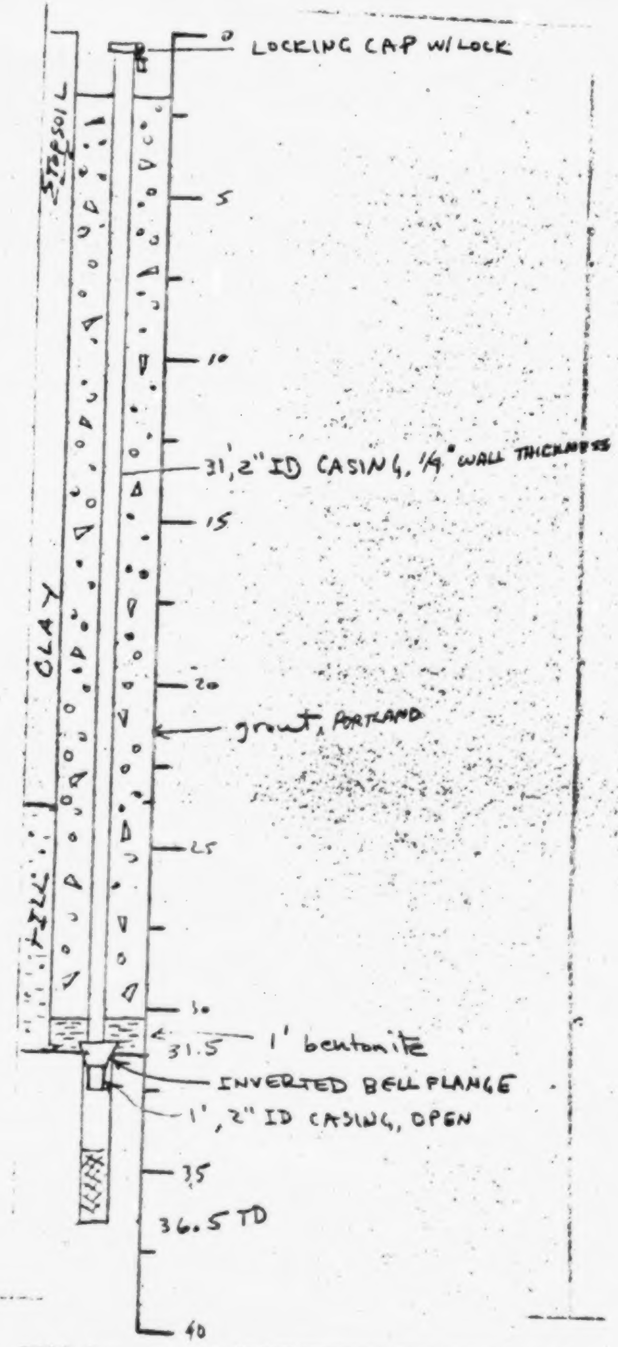
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

no pronounced change between clay and till. Drilling and Driving 6" casing more difficult at 23.5'.

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dave Conover

Well No. 19-B

Project Love Canal

Location Lot immediately south of 732 102nd St.

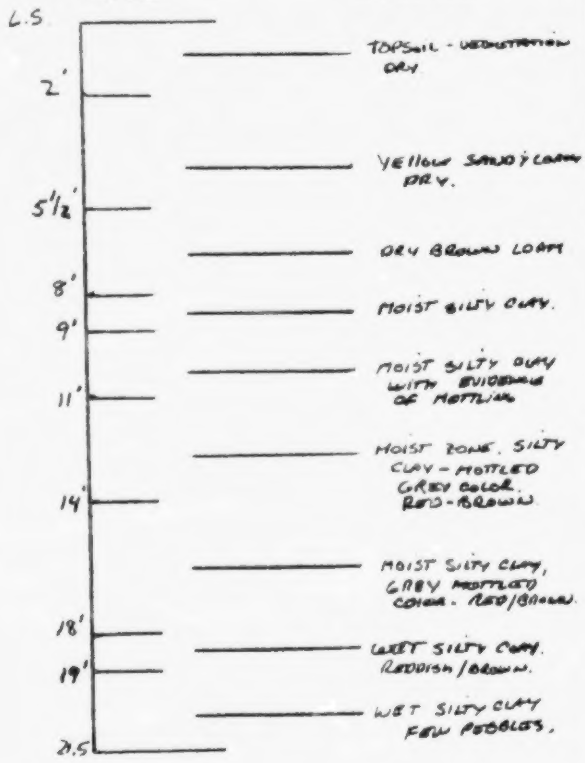
Date 9/9/80

Prepared By: Dave Conover

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



TOPSOIL - VEGETATION DRY

YELLOW SANDY LOAM DRY.

DRY BROWN LOAM

MOIST SILTY CLAY.

MOIST SILTY CLAY WITH EVIDENCE OF MOTTLING

MOIST ZONE. SILTY CLAY - MOTTLED GREY COLOR. RED-BROWN

MOIST SILTY CLAY, GREY MOTTLED COLOR. RED/BROWN.

WET SILTY CLAY. REDDISH/BROWN.

WET SILTY CLAY FEW PEBBLES.

1" = 5'

PROJECT Love Canal

OWNER Carol L. Yorio

WELL NO. 20-A

LOCATION Vacant lot S. of 639 101st St.

	Date	Time
DRILLING STARTED	9/24/80	1530
DRILLING COMPLETED	9/24/80	1710

DRILLER Roger Logel

GEOLOGIST Ed Tokarski

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION ~~not surveyed~~ 574.2

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES 27-28

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 21.5'

CASING DIAMETER 2"

CASING LENGTH 21.2'

SCREEN DIAMETER 2"

SCREEN SETTING 19.5'-17.5'

SCREEN SLOT/TYPE .0001" Stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry Hole

DATE MEASURED 9/24/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

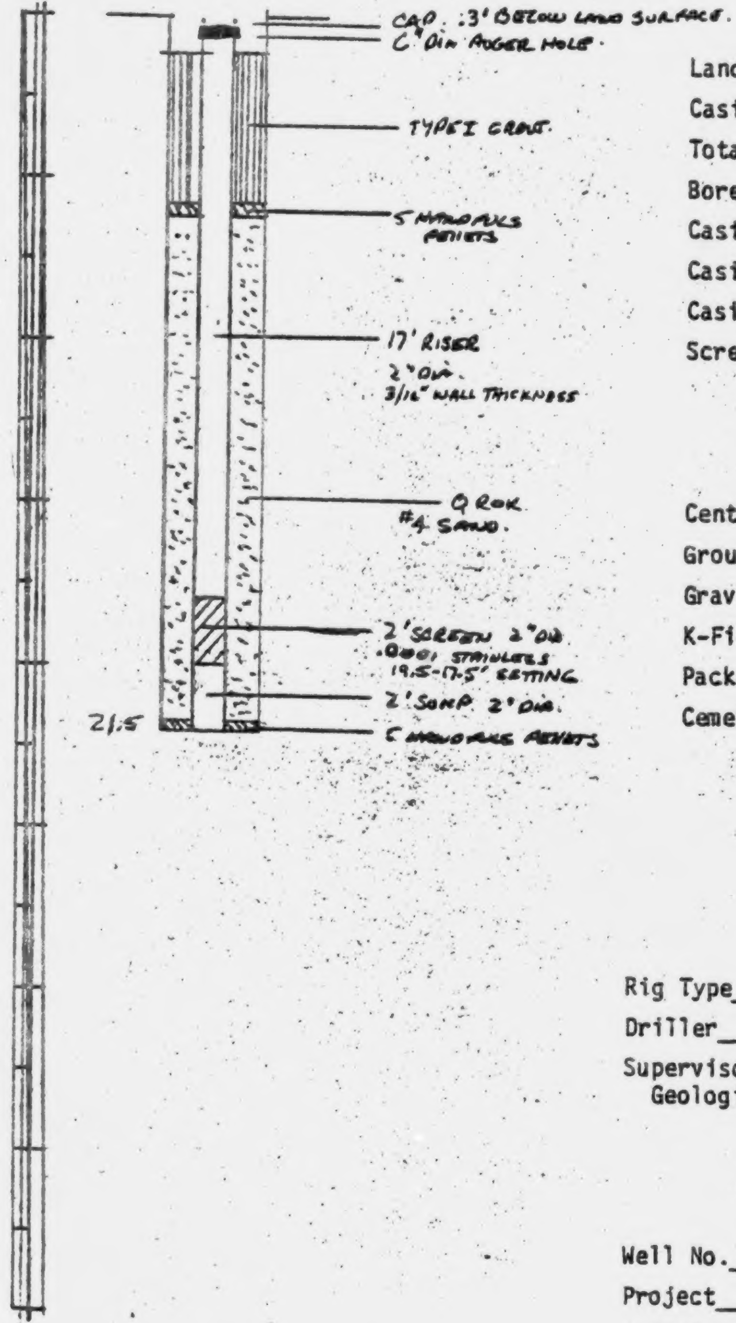
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Drillers helper sliced hand on 55 gal. drum report made - gloves worn.

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Seitings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist Ed Tokarski

Well No. 20-A

Project Love Canal

Location vacant lot S. of 639 101st St.

Prepared By: Ed Tokarski

Scale: 1"=5'

Date 9/24/80

WELL LOG

PROFILE	DESCRIPTION
0'	TOPSOIL/VEGETATION
2'	YELLOW LOAM. DRY. LITTLE ROOTS.
5.5'	DRY BROWN SANDY LOAM.
8'	MOIST SILTY CLAY.
9'	MOIST RED SILTY CLAY WITH GREY MOTTLED COLOR.
11'	MOIST RED SILTY CLAY WITH GRAY MOTTLED COLOR. MOISTER THAN ABOVE CLAY.
14'	MOIST RED SILTY CLAY. GREY MOTTLED COLOR VERY DEVELOPED.
18'	WET RED SILTY CLAY. NO MOTTLING.
19'	WET RED SILTY CLAY WITH GREY MOTTLING
21.5'	Till - DOLOMITE PEBBLES IN RED MATRIX.
30'	Till BUT WITH SAND
30.5'	DOLOMITE.
35.8'	

PROJECT Love Canal

OWNER Carol L. Yorio

WELL NO. 20-B

LOCATION vacant lot S. of 639 101st St.

	Date	Time
DRILLING STARTED	9/24/80	0940
DRILLING COMPLETED	9/27/80	1615

DRILLER Roger Logel

GEOLOGIST Ed Tokarski

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 574.2

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES 26-30, 37

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 35.8'

CASING DIAMETER 4"

CASING LENGTH 30.8'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A .0001"

DEPTH TO BEDROCK 30.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 8.7'

DATE MEASURED 9/27/80 @ 1630

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

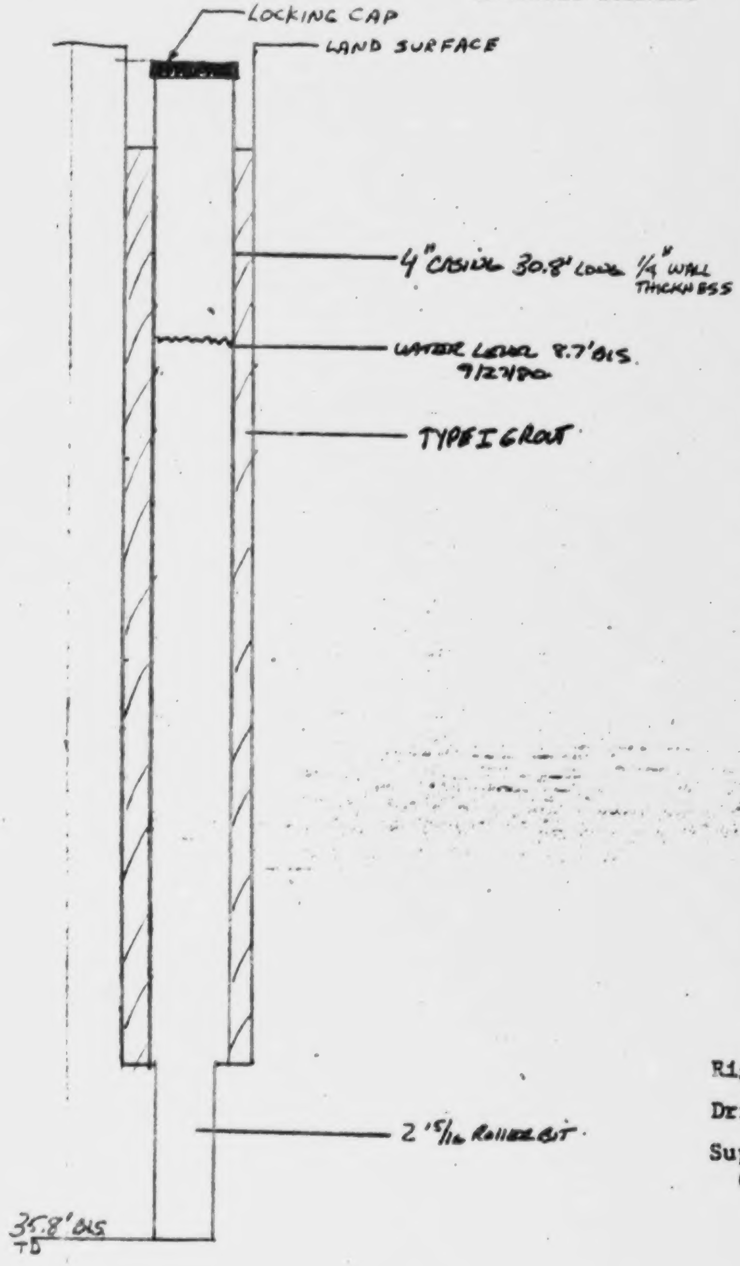
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING


LOCKING CAP
LAND SURFACE
4" CASING 30.8' LONG 1/4" WALL THICKNESS
WATER LEVEL 8.7' BLS 9/27/80
TYPE I GROUT
2 15/16 ROLLER BIT
35.8' BLS TD

CHECKLIST

Land Surface Elevation

Casing Height Above L-S

Total Depth

Borehole Diameter

Casing Diameter

Casing Thickness

Casing Lengths

Screen Data

- Material
- Diameter
- Slot Openings
- Settings

Centralizers

Grout Type

Gravel Pack

K-Fittings

Packers

Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist Ed Tokarski

Well No. 20-B

Project Love Canal

Location Vacant lot S. of 639 101st.

Date 9/27/80

Prepared By: Ed Tokarski

Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
0	
	VEGETATION/ TOPSOIL
2'	
	Fill - BROWN BRICK STONES - MOIST
5'	
	LOAM. DISTINCT GREY MOTTLING - RED BROWN MOIST
7'	
	RED BROWN SILTY CLAY MOIST
9'	
	MOIST SILTY CLAY. RED BROWN. GREY MOTTLING
15'	
	WET SILTY/CLAY- RED
20'	

PROJECT Love Canal

OWNER Mary Rich Walder

WELL NO. 21-A

LOCATION 539 101st St. - rear

	Date	Time
DRILLING STARTED	9/26/80	1430
DRILLING COMPLETED	9/26/80	1555

DRILLER Roger Logel

GEOLOGIST Ed Tokarski

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 575.3

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES 34

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 19.9' BLS

CASING DIAMETER 2"

CASING LENGTH 19'

SCREEN DIAMETER 2"

SCREEN SETTING 17.9'-15.9' BLS

SCREEN SLOT/TYPE .0001" Stainless

X

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/26/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

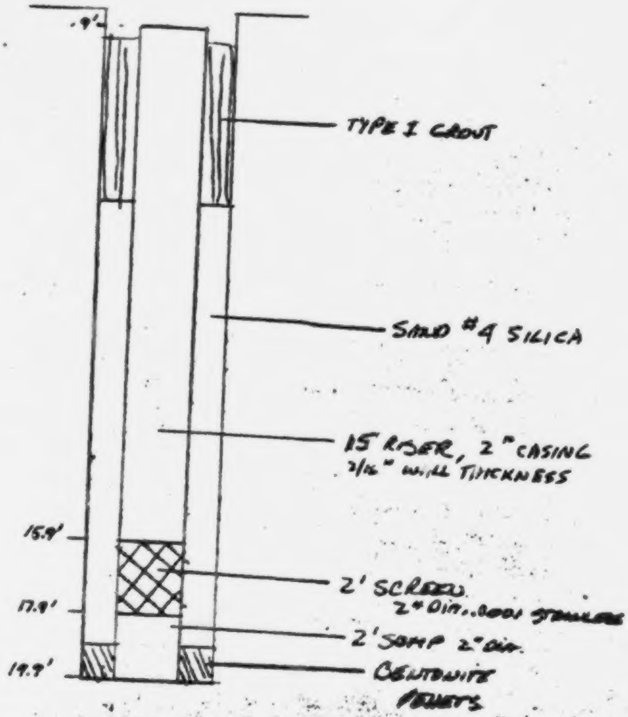
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist Ed Tokarski

Well No. 21-A

Project Love Canal

Location 539 101st St. - rear

Date 9/26/80

Prepared By: Ed Tokarski

Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
0	
	VEGETATION / TOPSOIL
2'	
	Fill - BRICKS / STONES BROWN - MOIST
4'	
	Fill - VERY MUDDY SULFER SMELL
5'	
	LOAM - GREY MOTTLING - BROWN
7'	
	LOAM - GREY MOTTLED COLOR - RED BROWN
9'	
	MOIST SILTY CLAY - RED BROWN
15'	
	WET SILTY CLAY - RED
17.5'	
	Till - DOLOMITE PEBBLES IN REDDISH MATRIX MOIST.
33.7'	
	DOLOMITE
35.0'	

PROJECT Love Canal
OWNER Mary Rich Walder
WELL NO. 21-B
LOCATION 539 101st St. - rear

	Date	Time
DRILLING STARTED	9/25/80	1105
DRILLING COMPLETED	9/27/80	1240

DRILLER Roger Logel
GEOLOGIST Ed Tokarski
RIG TYPE CME-45C
REFERENCE POINT land surface
R.P. ELEVATION not surveyed 575.3
TOPO POSITION flat lying
PROFILE BY Ed Tokarski
FIELD BOOK NO. 10 PAGES 32-34

WELL DATA

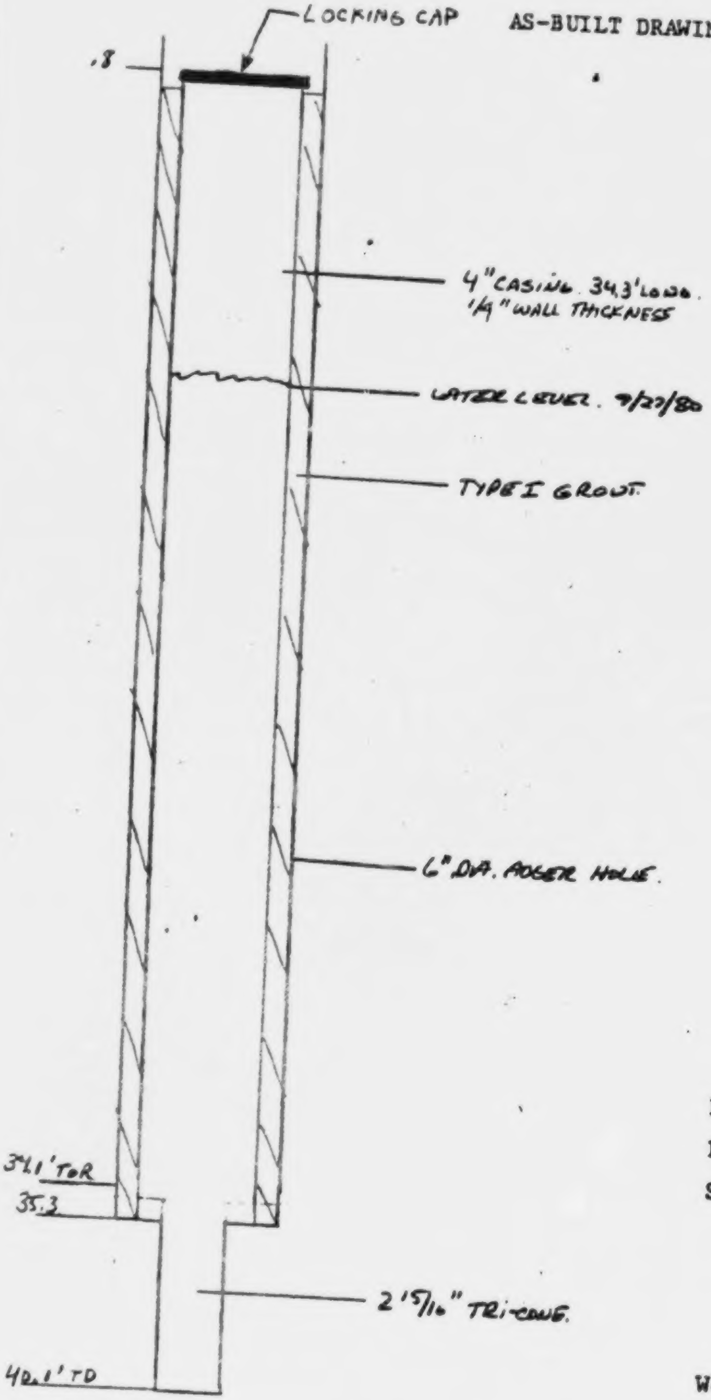
HOLE DIAMETER 6" - 2 15/16
HOLE DEPTH 40.1' BLS
CASING DIAMETER 4"
CASING LENGTH 34.3'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A .0001"
DEPTH TO BEDROCK 33.7'

PUMP TEST DATA

STATIC DEPTH TO WATER 10.2'
DATE MEASURED 9/27/80
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
    - Material
    - Diameter
    - Slot Openings
    - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist Ed Tokarski

Well No. 21-B

Project Love Canal

Location 539 101st St. - rear

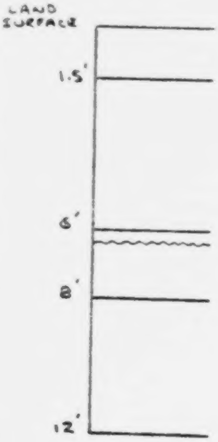
Prepared By: Ed Tokarski

Scale: 1"=5'

Date 9/27/80

WELL LOG

PROFILE



DESCRIPTION

DARK BROWN SILT LOAM, SLIGHTLY MOIST, FIRM, FILL

DARK GRAY BROWN SILT LOAM, MOIST, SOMEWHAT LOOSE

DARK GRAY SILTY CLAY MOIST TO WET, COMMON GRAVEL

PALE GRAY AND GRAY BROWN SILTY CLAY MOIST, PLASTC, STICKY

SCALE: 1" = 5'

PROJECT Love Canal
OWNER Unknown
WELL NO. 25-A
LOCATION Behind 93rd St. School

	Date	Time
DRILLING STARTED	9/9/80	1504
DRILLING COMPLETED	9/9/80	1626

DRILLER Joe Jensen
GEOLOGIST Mitch Brodsky
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed
TOPO POSITION flood plain
PROFILE BY Mitch Brodsky
FIELD BOOK NO. 5 PAGES 1-3

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 12.0'
CASING DIAMETER 2"
CASING LENGTH 11.55'
SCREEN DIAMETER 2"
SCREEN SETTING 9.55'-11.55' - capped
SCREEN SLOT/TYPE .0001" slot/stainless steel

PUMP TEST DATA

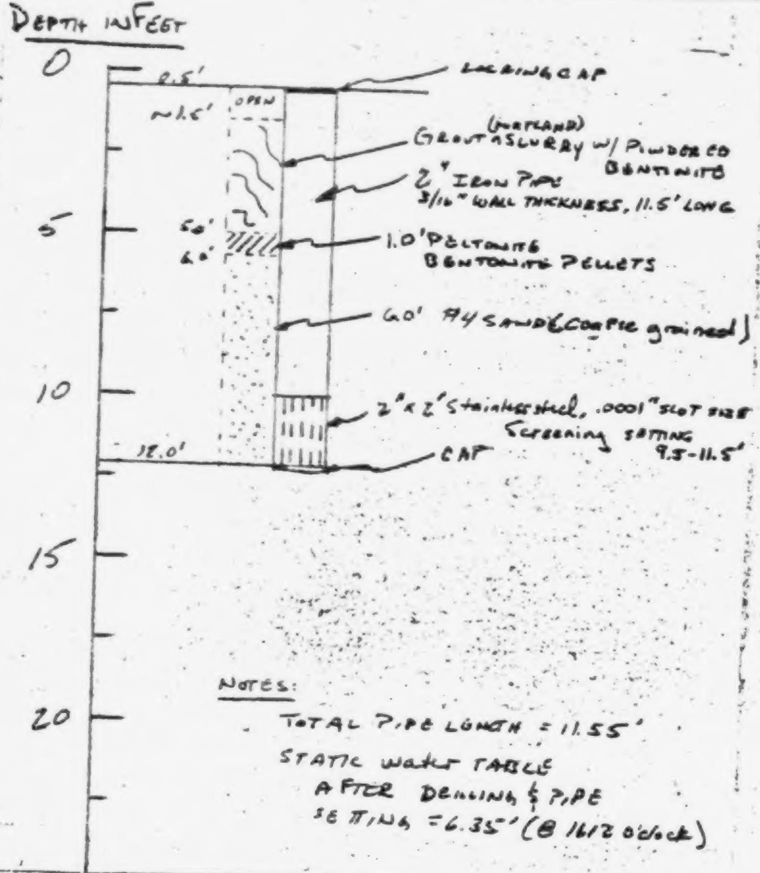
STATIC DEPTH TO WATER 6.35'
DATE MEASURED 9/9/80 @ 1612
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets


DEPTH IN FEET
0
5
10
15
20
0.5'
~1.5'
OPEN
LOCKING CAP
(PORTLAND)
GROUT SLURRY w/ POWDERED BENTONITE
2" IRON PIPE
3/16" WALL THICKNESS, 11.5' LONG
5.0'
6.0'
1.0' PELTONITE BENTONITE PELLETS
6.0' #4 SAND (COARSE grained)
2" x 2' Stainless steel, .0001" SLOT SIZE
SCREENING SETTING 9.5-11.5'
12.0'
CAP

NOTES:

- TOTAL PIPE LENGTH = 11.55'
- STATIC water TABLE AFTER DRILLING & PIPE SETTING = 6.35' (@ 1612 o'clock)

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Mitch Brodsky

Well No. 25-A

Project Love Canal

Location Behind the 93rd St. School

Date 9/9/80

Prepared By: Mitch Brodsky

Scale: 1"=5'

WELL LOG

Depth	PROFILE	DESCRIPTION
	LAND SURFACE	
0	Topsoil and Fill	DARK BROWN loam with chunks of glass and slag
1.5	Clayey silt	gritty grey layer with enough clay to be partially molded
4	Gritty Grey Stuff	DARK grey gritty and sticky unit. Some glass fragments and a STRONG ODOR of sewage
5'		
9½		← first water
10'	CLAY	Dark BROWN Stiff clay, dry for the MOST part except at the top and bottom of the unit
15'		
20'		← second water
22.5	Till	Reddish, pebbly, silty till
25'		
26.9	Bedrock	← split spoon sample Dolomite – no loss of water but a sharp INCREASE in the specific conductivity at 5-5½' into Rock (31 to 31½' BLS)
30'		
35'		

1 inch = 5 feet

PROJECT Love Canal

OWNER Unknown

WELL NO. 25-B

LOCATION Behind the 93rd St. School

	Date	Time
DRILLING STARTED	9/8/80	1704
DRILLING COMPLETED	9/9/80	1445

DRILLER Joe Jensen

GEOLOGIST Charlie Kufs

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 574.1

TOPO POSITION flood plain

PROFILE BY C. Kufs

FIELD BOOK NO. 3 PAGES 29-31

WELL DATA

HOLE DIAMETER 6" to bedrock; 2 15/16" into bedrock

HOLE DEPTH 32.9'

CASING DIAMETER 2"

CASING LENGTH 27.5'

SCREEN DIAMETER --

SCREEN SETTING --

SCREEN SLOT/TYPE -- .0001"

DEPTH TO BEDROCK 26.9'

PUMP TEST DATA

STATIC DEPTH TO WATER 12.2' from top of casing

DATE MEASURED 1445 on 9/9/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

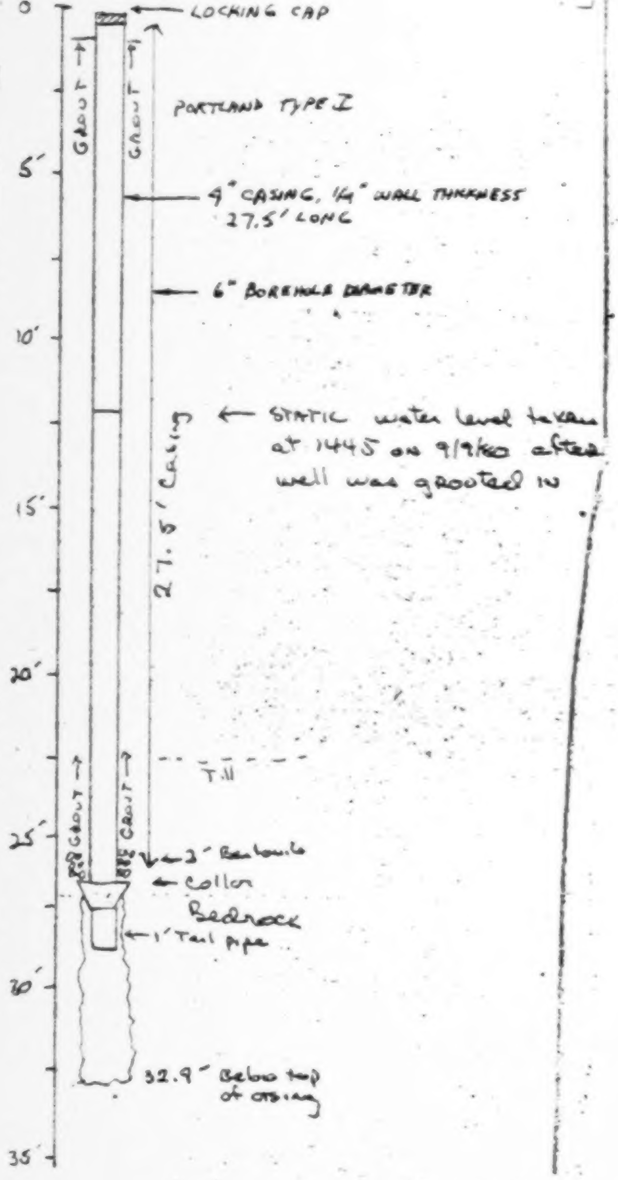
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Joe Jensen
Supervisory Geologist Charlie Kufs

Well No. 25-B
Project Love Canal
Location Behind the 93rd St. School

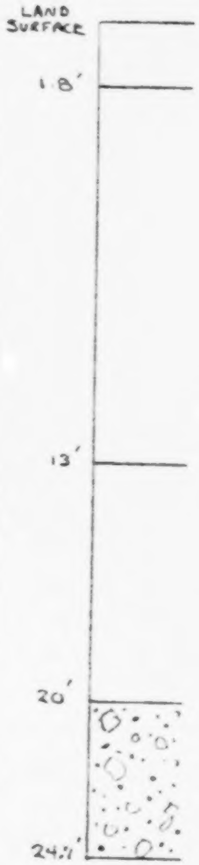
Date 9/9/80

Prepared By: C. Kufs
Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



← BROWN SILTY CLAY LOAM

← BROWN TO DARK BROWN SILTY CLAY, MOIST AND STICKY

← BROWN TO GRAY BROWN SILTY CLAY, WET AND VERY STICKY

← GLACIAL TILL

SCALE: 1in = 5ft

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 26-A

LOCATION Middle of field behind 93rd St. School

	Date	Time
DRILLING STARTED	9/6/80	15:55
DRILLING COMPLETED	9/8/80	10:58

DRILLER Joe and Leo Jensen

GEOLOGIST Charlie Kufs

RIG TYPE CME - 55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 571.1

TOPO POSITION flat lying

PROFILE BY C. Kufs

FIELD BOOK NO. 3 PAGES 25 & 26

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 24.7'

CASING DIAMETER 2"

CASING LENGTH 2.45'

SCREEN DIAMETER 2" (5 foot screen)

SCREEN SETTING 19.7' to 24.7' - BLS

SCREEN SLOT/TYPE 10 Slot .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER dry on 9/6/80} ½" of water @15:50 on 9/8/80

DATE MEASURED

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

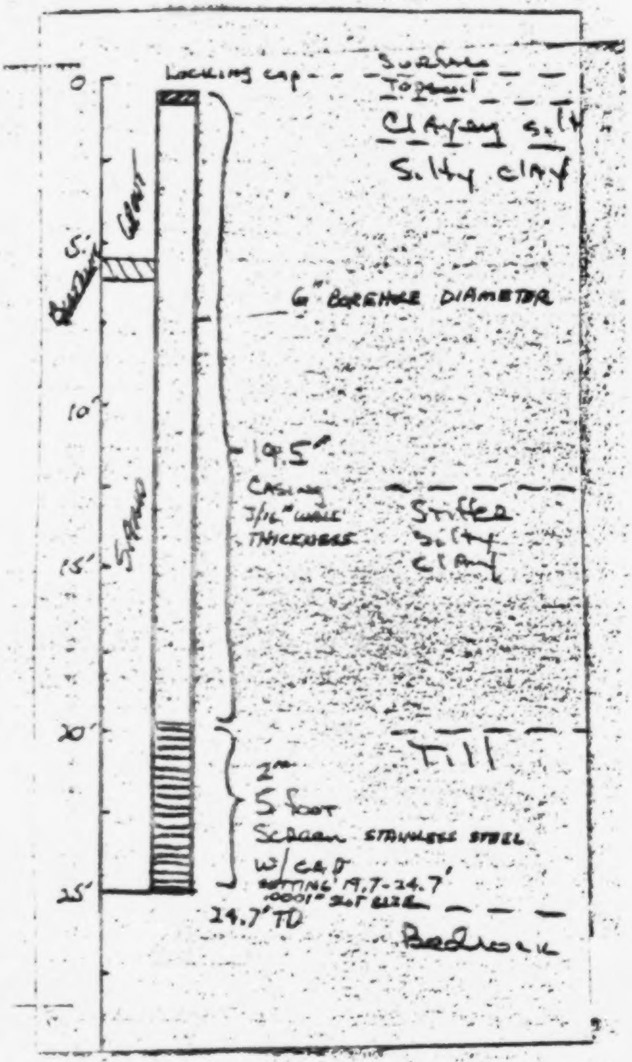
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Charlie Kufs

Well No. 26-A

Project Love Canal

Location Middle of field behind 93rd St. School

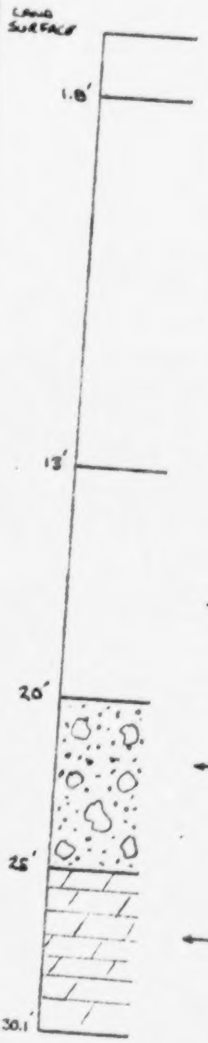
Prepared By: C. Kufs

Scale: 1"=5"

Date 9/8/80

WELL LOG

PROFILE



DESCRIPTION

BROWN SILTY CLAY LOAM

BROWN TO DARK BROWN SILTY CLAY, MOIST, STICKY

BROWN TO GRAY BROWN SILTY CLAY, WET, VERY STICKY

GLACIAL TILL

LOCKPORT DOLOMITE

SCALE: 1 in = 5 ft

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 26-B

LOCATION Middle of field behind 93rd St. School

	Date	Time
DRILLING STARTED	9/6/80	13:15
DRILLING COMPLETED	9/8/80	16:16

DRILLER Joe and Leo Jensen

GEOLOGIST Charlie Kufs

RIG TYPE CME-55

REFERENCE POINT Land surface

R.P. ELEVATION no survey yet 571.1

TOPO POSITION Flat lying

PROFILE BY C. Kufs

FIELD BOOK NO. 3 PAGES 24-28

WELL DATA

HOLE DIAMETER 6" to bedrock 3½ in rock

HOLE DEPTH 30.1'

CASING DIAMETER 2"

CASING LENGTH 26.8'

SCREEN DIAMETER --

SCREEN SETTING --

SCREEN SLOT/TYPE -- .0001"

DEPTH TO BEDROCK 25'

PUMP TEST DATA

*STATIC DEPTH TO WATER not yet measured

DATE MEASURED

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

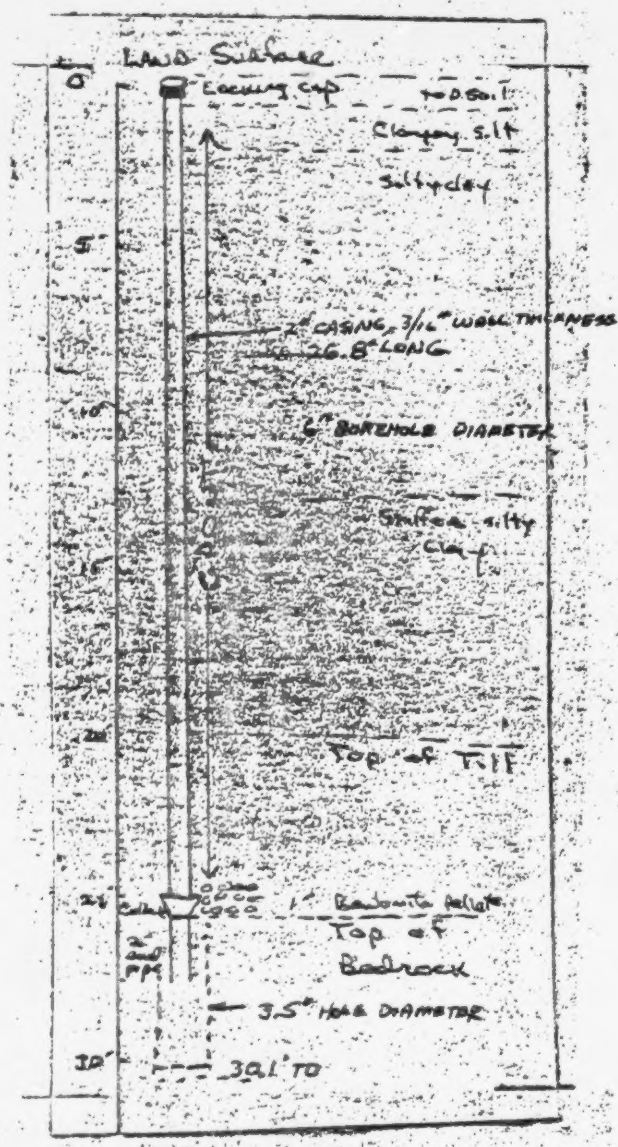
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

*21.1' to H_2O BLS@ 13:55 on 9/6/80 before well put in

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Joe Jensen
Supervisory Geologist Charlie Kufs

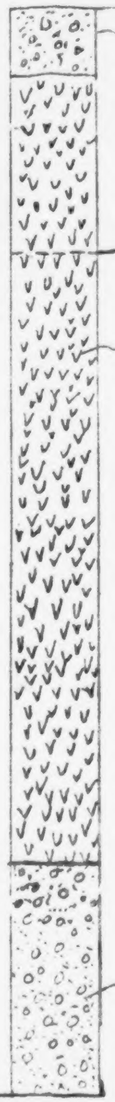
Well No. 26-B
Project Love Canal
Location Middle of field behind 93rd St. School

Date 9/8/80

Prepared By: C. Kufs
Scale: 1"=5'

WELL LOG

PROFILE **DESCRIPTION**



0' — Ground level

dirt - yellow brown, powdery with rock and fill, up to 2" rock and brown powdery dirt matrix.

2'

water level - 7.4', 4 hours after completion 17:33-9/11

clay - light brown to greyish brown

26'

till - dolomite pebbles and stones, silty clay matrix

32'9"

PROJECT Love Canal

OWNER Unknown

WELL NO. 27-A

LOCATION W. of 95th St., N. of apartment unit #2

	Date	Time
DRILLING STARTED	9/11/80	0735
DRILLING COMPLETED	9/11/80	1301

DRILLER Roger Logel

GEOLOGIST D. Robertson

RIG TYPE CME 45C

REFERENCE POINT Ground surface

R.P. ELEVATION not yet surveyed 573.3

TOPO POSITION flat lying

PROFILE BY D. Robertson

FIELD BOOK NO. 7 PAGES 37-40

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 32.7'

CASING DIAMETER 2"

CASING LENGTH 32.0'

SCREEN DIAMETER 2"

SCREEN SETTING 32.58' - 27.5'

SCREEN SLOT/TYPE 10" slot stainless steel .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER 7.4'

DATE MEASURED 9/11/80 1733

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

PUMP SETTING

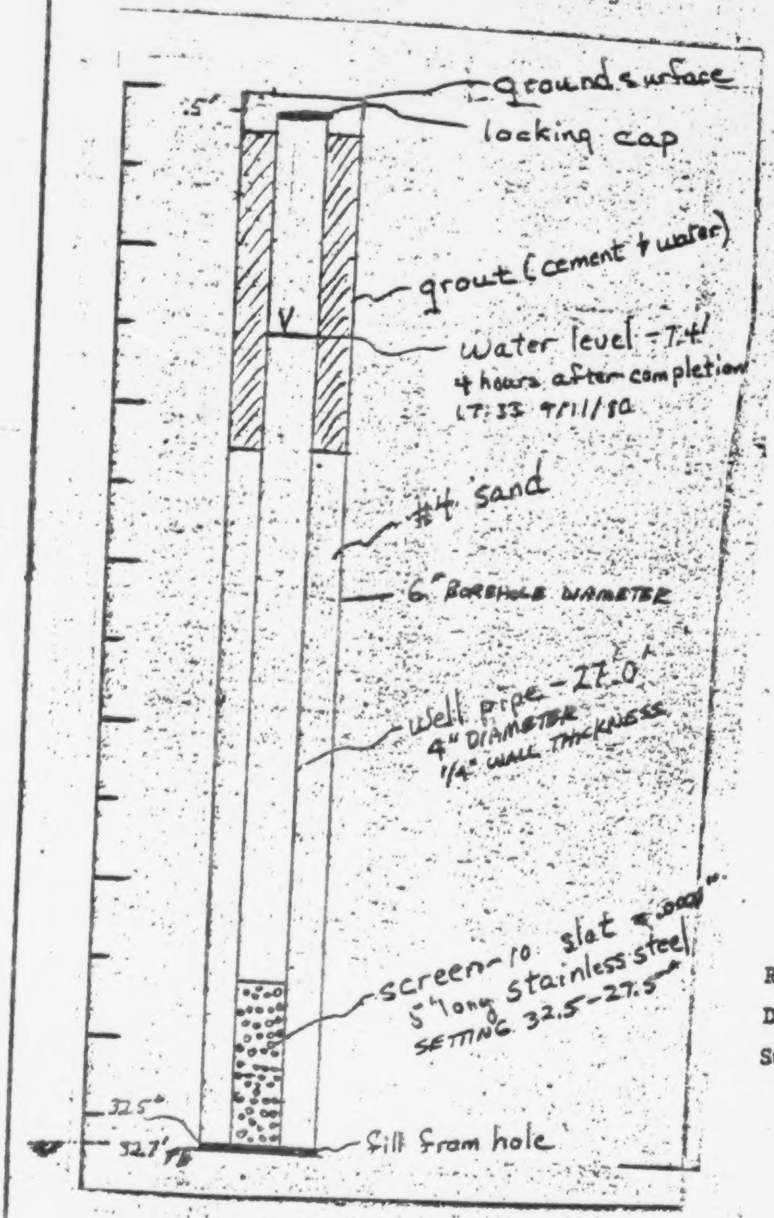
SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

No culvert or top

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
- Material
- Diameter
- Slot Openings
- Settings

Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C
Driller Roger Logel
Supervisory Geologist David Robertson

Well No. 27-A
Project Love Canal
Location West of 95th St., north of Apt. Unit #2
Date 9/11/80

Prepared By: David Robertson
Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
LAND SURFACE	SILTY CLAYEY LOAM
2'	BROWNISH YELLOW SILTY CLAY
3'	GRAY BROWN SILTY CLAY, DRY
4'	GRAY BROWN SILTY CLAY SLIGHTLY MOIST
6'	GRAY TO RED BROWN SILTY CLAY MOIST
7.5'	RED BROWN CLAY MOIST
8'	RED BROWN CLAY VERY MOIST
12'	RED GRAY BROWN CLAY WET
21.5	RED BROWN CLAY MOIST
25	TILL PEBBLE AGGREGATE
29.3	AUGER PLUG

1" = 5 FEET

PROJECT Love Canal

OWNER Unknown

WELL NO. 28-A

LOCATION East of 93rd St., South of Apt. #709

	Date	Time
DRILLING STARTED	9/15/80	1400
DRILLING COMPLETED	9/15/80	1520

DRILLER Ed Cole

GEOLOGIST Dennis T. Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 572.9

TOPO POSITION flat lying

PROFILE BY Dennis T. Stanczuk

FIELD BOOK NO. 2 PAGES 38-39

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 29.3'

CASING DIAMETER 2"

CASING LENGTH 28.5'

SCREEN DIAMETER 2"

SCREEN SETTING 24.5' to 22.5'

SCREEN SLOT/TYPE Johnson 10 slot stainless .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER no water

DATE MEASURED 9/15/80 1500

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

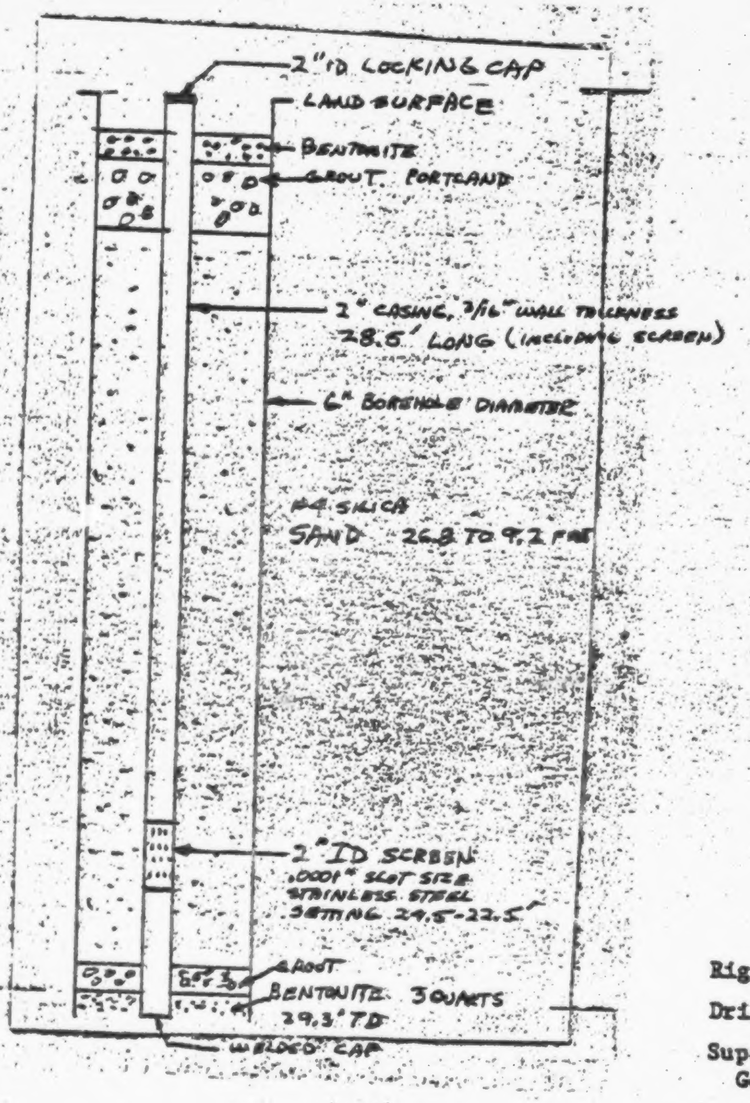
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Well finished with locking cap but no lock

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type: Acker AD-2
Driller: Ed Cole
Supervisory Geologist: Dennis Stanczuk

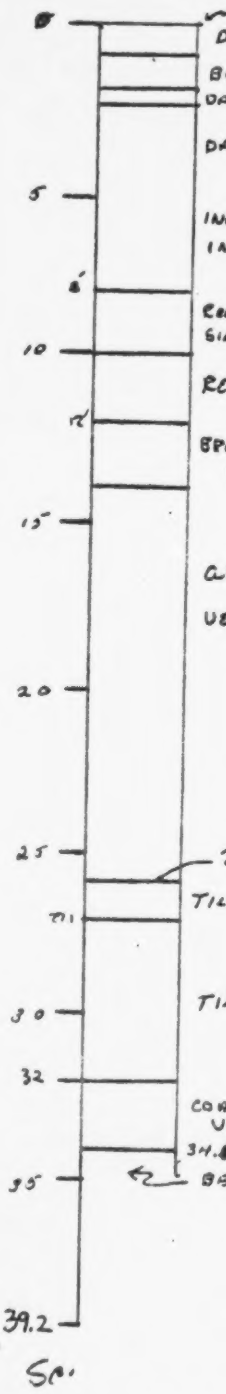
Well No.: 28-A
Project: Love Canal
Location: East of 93rd St., south of Apt. #709

Prepared By: Dennis Stanczuk
Scale: 1"=5'

Date: 9/15/80

WELL LOG

PROFILE DESCRIPTION



LAND SURFACE

DARK BROWN SANDY LOAM

BROWN SANDY LOAM

DARK BROWN DENSE SILTY CLAY

DARK BROWN SILTY CLAY

INCREASE IN MOISTURE IN LOWER PART

Reddish BROWN SILTY CLAY

REDDISH CLAY

BROWNISH GRAY CLAY WET

GRAY CLAY

VERY MOIST AND STICKY

TILL SOFT AND WET

TILL HARD

COARSE SAND AND GRAVELY TILL VERY WET

BED ROCK

PROJECT Love Canal

OWNER Unknown

WELL NO. 28-B

LOCATION 93rd St. in yard of retirement home

	Date	Time
DRILLING STARTED	9/12/80	1525
DRILLING COMPLETED	9/15/80	1320

DRILLER Ed Cole

GEOLOGIST Alfred Wickline/Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION has not been surveyed 572.9

TOPO POSITION flat lying

PROFILE BY Alfred Wickline

FIELD BOOK NO. 6& 2 PAGES 51/33-38

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 39'

CASING DIAMETER 2'

CASING LENGTH 35.9'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A .0001"

DEPTH TO BEDROCK 34.6'

PUMP TEST DATA

STATIC DEPTH TO WATER 8' below grade

DATE MEASURED 9/15/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

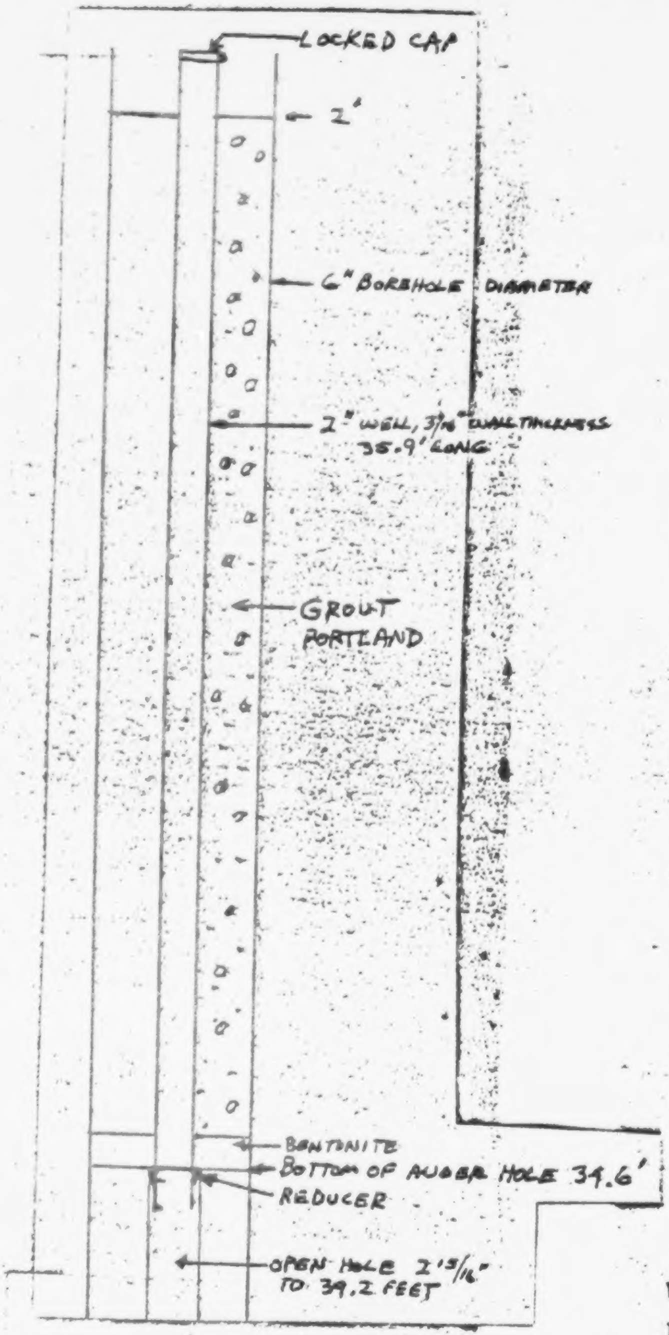
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
    - Material
    - Diameter
    - Slot Openings
    - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist Dennis Stanczuk

Well No. 28-B

Project Love Canal

Location East of 93rd St. south of Apt. #709

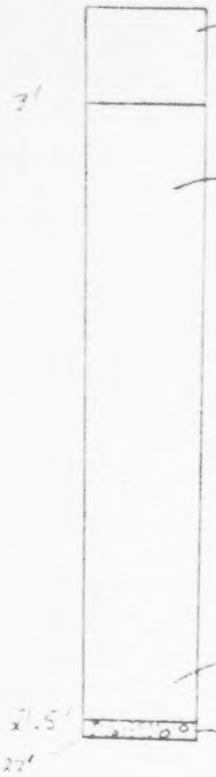
Date 9/15/80

Prepared By: Dennis Stanczuk

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



fill - silt and sand, yellow to yellowish brown

clay - brown to grey brown, moist and sticky

fine yellow sand and pebbles interspersed in clay

till

PROJECT Love Canal
OWNER Unknown
WELL NO: 29-A
LOCATION South of Apt. #1, west of 95th St.

	Date	Time
DRILLING STARTED	9/13/80	0751
DRILLING COMPLETED	9/13/80	1245

DRILLER Roger Logel
GEOLOGIST David Robertson
RIG TYPE CME-45C
REFERENCE POINT ground level
R.P. ELEVATION not yet surveyed 573.3
TOPO POSITION flat lying
PROFILE BY David Robertson
FIELD BOOK NO. 7 PAGES 45-47

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 22'
CASING DIAMETER 2"
CASING LENGTH 21.5'
SCREEN DIAMETER 2"
SCREEN SETTING 22' to 17'
SCREEN SLOT/TYPE 10 slot - Stainless Steel
.0001"

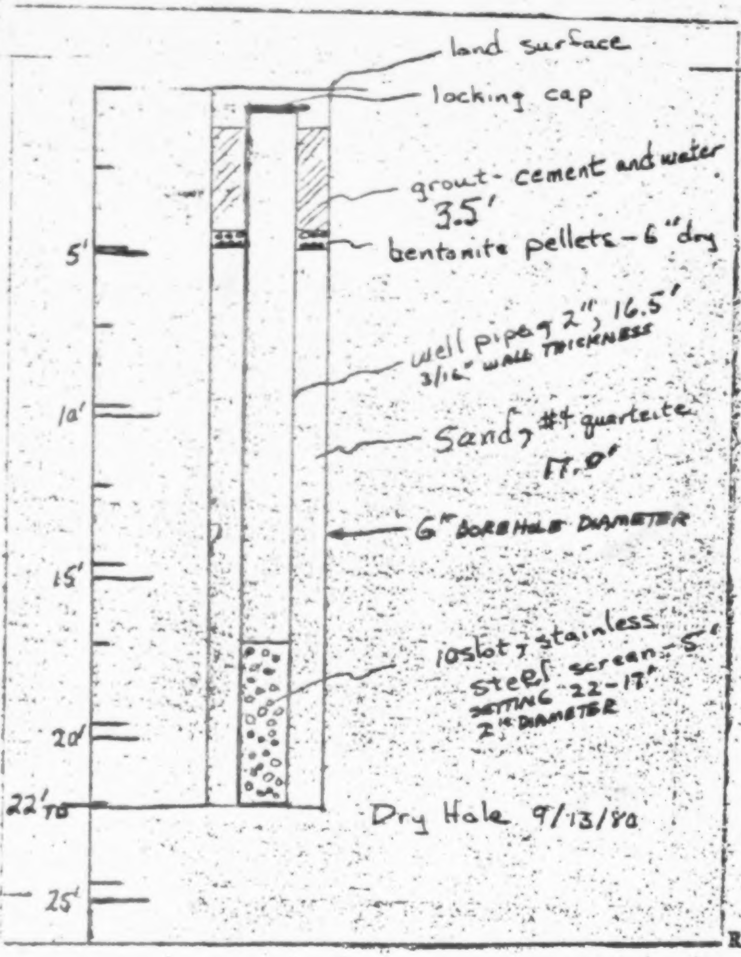
PUMP TEST DATA

STATIC DEPTH TO WATER Dry Hole
DATE MEASURED 9/13/80
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Well finished with locking cap
No culvert or cap

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C
Driller Roger Logel
Supervisory Geologist David Robertson

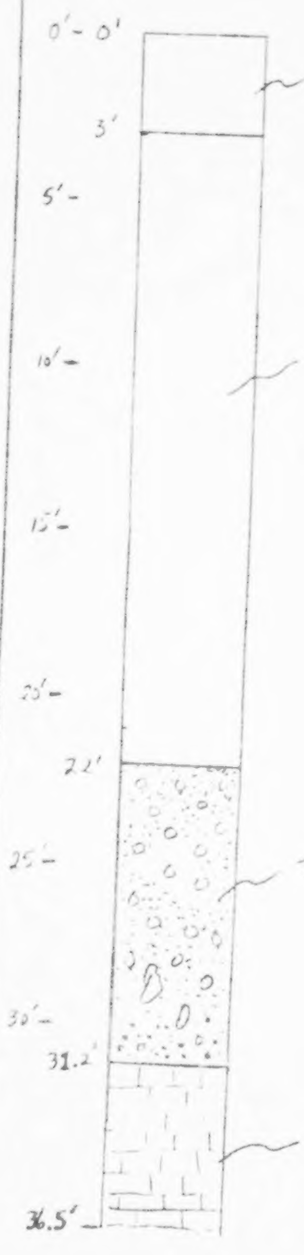
Well No. 29-A
Project Love Canal
Location West of 95th St., south of apt. #1
Date 9/13/80

Prepared By: David Robertson
Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



fill - silt + sand; brown and yellow

clay - greyish brown moist and sticky

till - dolomite stones and pebbles, calcite quartz and orthoclase sand, silty clay matrix

Lockport dolomite - grey, with seams of gypsum up to .2" thick, porous,

PROJECT Love Canal

OWNER Unknown

WELL NO. 29-B

LOCATION South of Apt #1, West of 95th St.

	Date	Time
DRILLING STARTED	9/11/80	1525
DRILLING COMPLETED	9/13/80	1245

DRILLER Roger Logel

GEOLOGIST David Robertson

RIG TYPE CME-45C

REFERENCE POINT ground level

R.P. ELEVATION not yet surveyed 573.3

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 7 PAGES 40-47

WELL DATA

HOLE DIAMETER 6" - 4" - 2"

HOLE DEPTH 31.2' - 31.5' - 36.5'

CASING DIAMETER 4"

CASING LENGTH 31.0'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none .0001"

DEPTH TO BEDROCK 31.2'

PUMP TEST DATA

STATIC DEPTH TO WATER 1.93 m below well pipe

DATE MEASURED 9/13/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

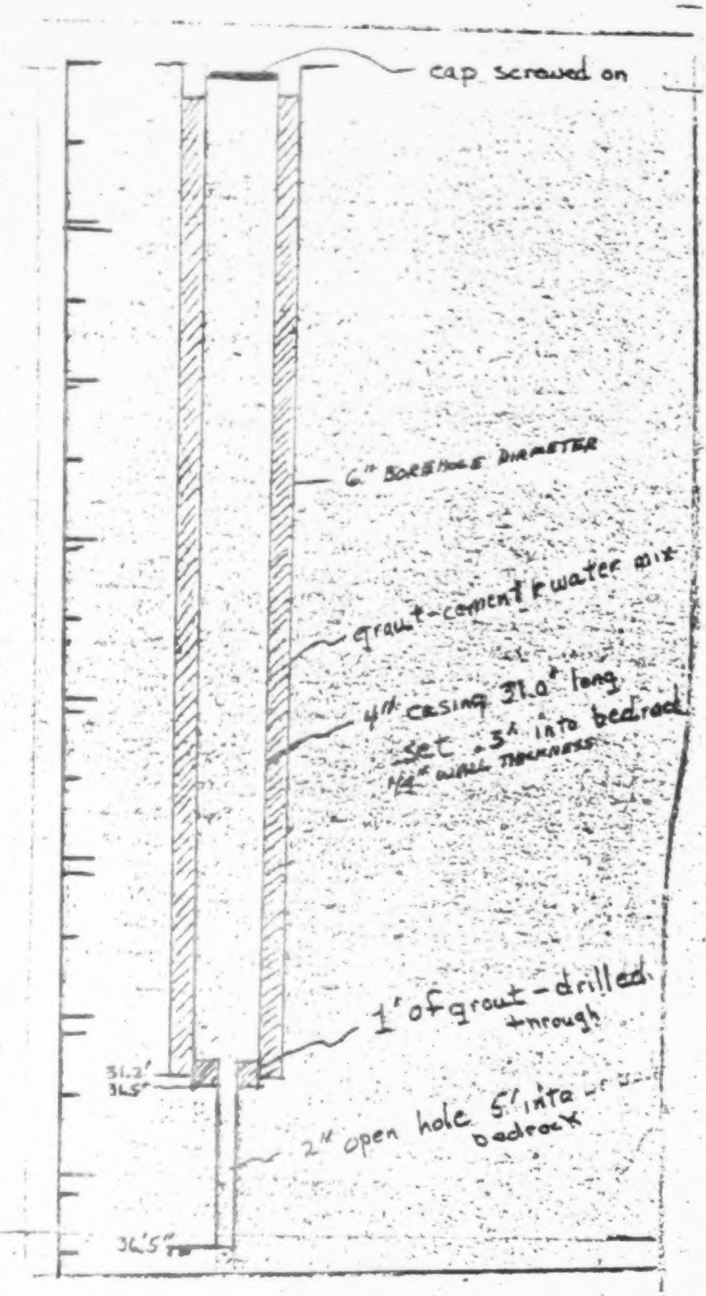
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist David Robertson

Well No. 29-B

Project Love Canal

Location West of 95th St., south of Apt. Unit 1

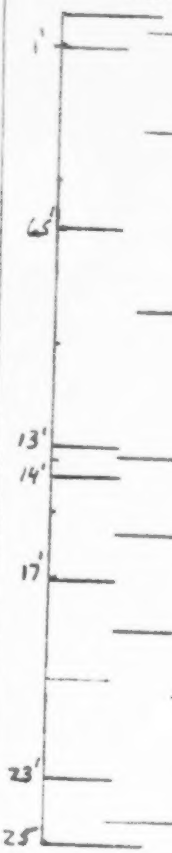
Date 9/13/80

Prepared By: David Robertson

Scale: 1"=5'

WELL LOG

PROFILE



DESCRIPTION

TOPSOIL - VEGETATION

SILTY - LOAM - DRY BROWN.

MOIST SILTY CLAY - BROWN - RED

PEBBLE LAYER.

MOIST SILTY CLAY RED.

WET SILTY CLAY RED.

TILL -

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 30-A

LOCATION 95th St., adjacent to fence

	Date	Time
DRILLING STARTED	9/18/80	1345
DRILLING COMPLETED	9/19/80	0800

DRILLER Joe Jensen

GEOLOGIST Ed Tokarski

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573.2

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES 6-16

WELL DATA

HOLE DIAMETER 4"

HOLE DEPTH 25'

CASING DIAMETER 2"

CASING LENGTH 24'

SCREEN DIAMETER 2"

SCREEN SETTING 24'-22'

SCREEN SLOT/TYPE .0001'Stainless

10 slot

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/19/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

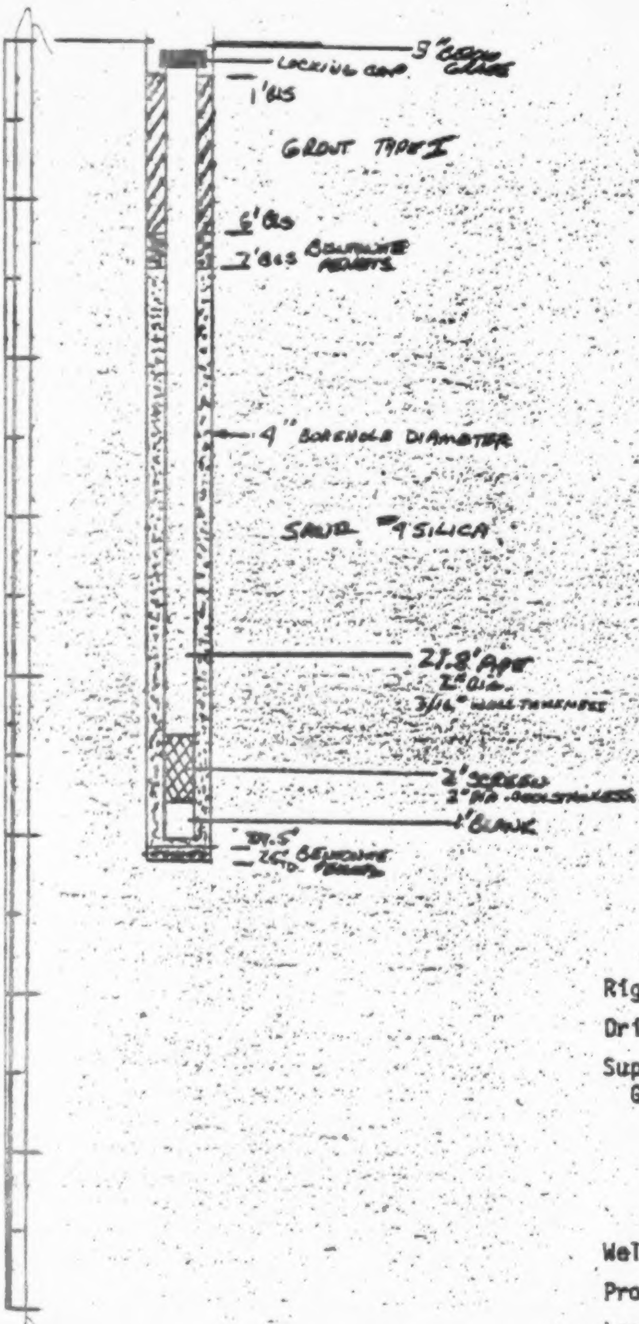
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Ed Tokarski

Well No. 30-A

Project Love Canal

Location 95th St. Adjacent to fence

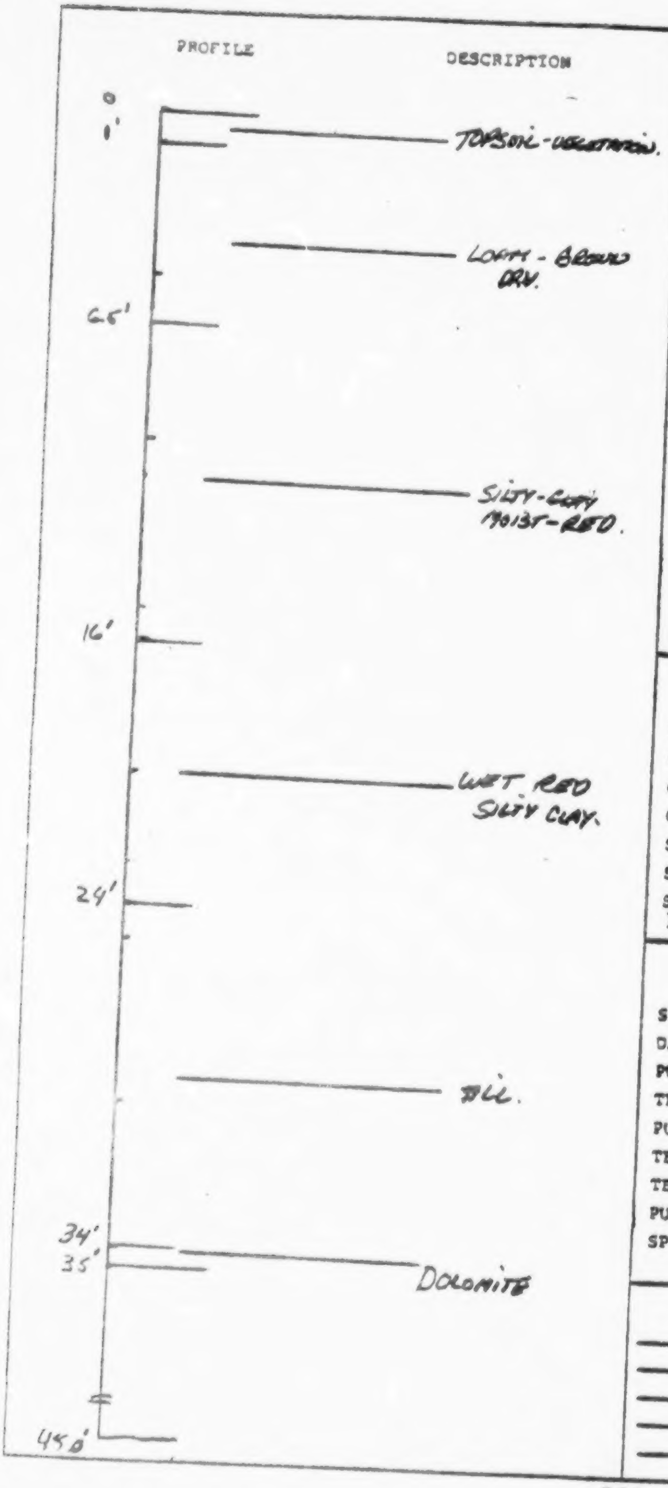
Prepared By: Ed Tokarski

Scale: 1"=5'

Date 9/19/80

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 30-B

LOCATION 95th St. adjacent to fence opposite 928 97th St.

	Date	Time
DRILLING STARTED	9/17/80	0805
DRILLING COMPLETED	9/22/80	1350

DRILLER Joe Jensen

GEOLOGIST Ed Tokarski & Charles Kufs

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573.2

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 & 3 PAGES 6-16/42

WELL DATA

HOLE DIAMETER 6"-4"-2"

HOLE DEPTH 45.5'

CASING DIAMETER 4"

CASING LENGTH 35.4'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A .0001"

DEPTH TO BEDROCK 34.2'

PUMP TEST DATA

STATIC DEPTH TO WATER 8'

DATE MEASURED 9/22/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

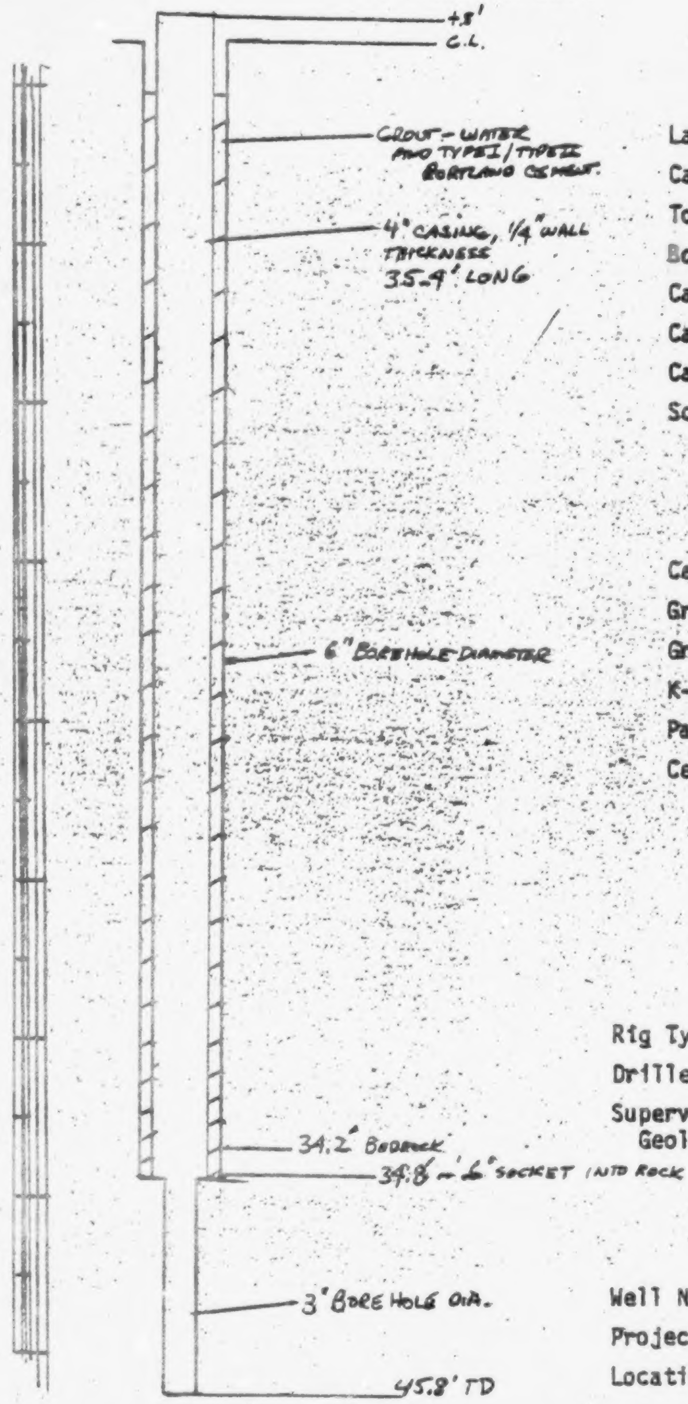
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING


+5'
C.L.
GROUT - WATER AND TYPE I/TYPE II PORTLAND CEMENT.
4" CASING, 1/4" WALL THICKNESS 35.4' LONG
6" BOREHOLE DIAMETER
34.2' BEDROCK
34.8' – .6' SOCKET INTO ROCK
3" BORE HOLE DIA.
45.8' TD

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Ed Tokarski

Well No. 30-B

Project Love Canal

Location 95th St. adjacent to fence

Date 9/22/80

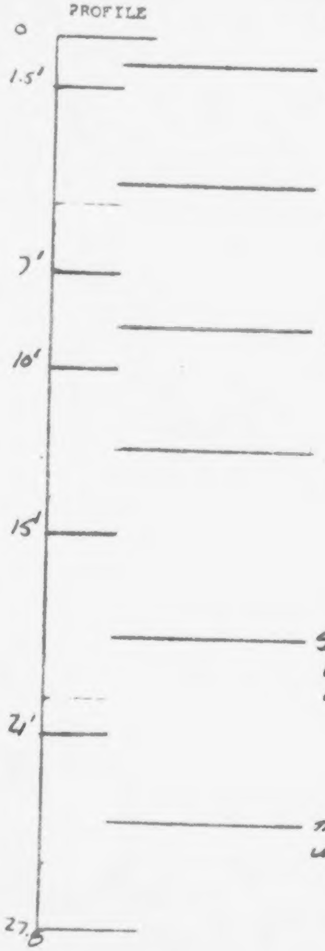
Prepared By: Ed Tokarski

Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



TOPSOIL - VEGETATION BROWN - DRY LUMPY

SILTY LOAMY - DRY WITH SOME PEBBLES.

SILTY SAND - BROWN GREY. NO PEBBLES DRY

SILTY CLAY - RED MOIST

SILTY CLAY - RED - WET WITH SOME PEBBLES.

Till REDMATRIX WITH SAND AND GRAVEL

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 31-A

LOCATION off 96th St. near apartment complex

	Date	Time
DRILLING STARTED	9/20/80	1335
DRILLING COMPLETED	9/20/80	1525

DRILLER Pat Parmentier

GEOLOGIST Ed Tokarski

RIG TYPE Mobile B-56

REFERENCE POINT ground level

R.P. ELEVATION not yet surveyed 573.1'

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES 18-20

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 27.8'

CASING DIAMETER 2"

CASING LENGTH 26.9'

SCREEN DIAMETER 2"

SCREEN SETTING 26.5'-24.5' BLS

SCREEN SLOT/TYPE .0001" stainless

PUMP TEST DATA

STATIC DEPTH TO WATER 11.9' BLS

DATE MEASURED 9/20/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

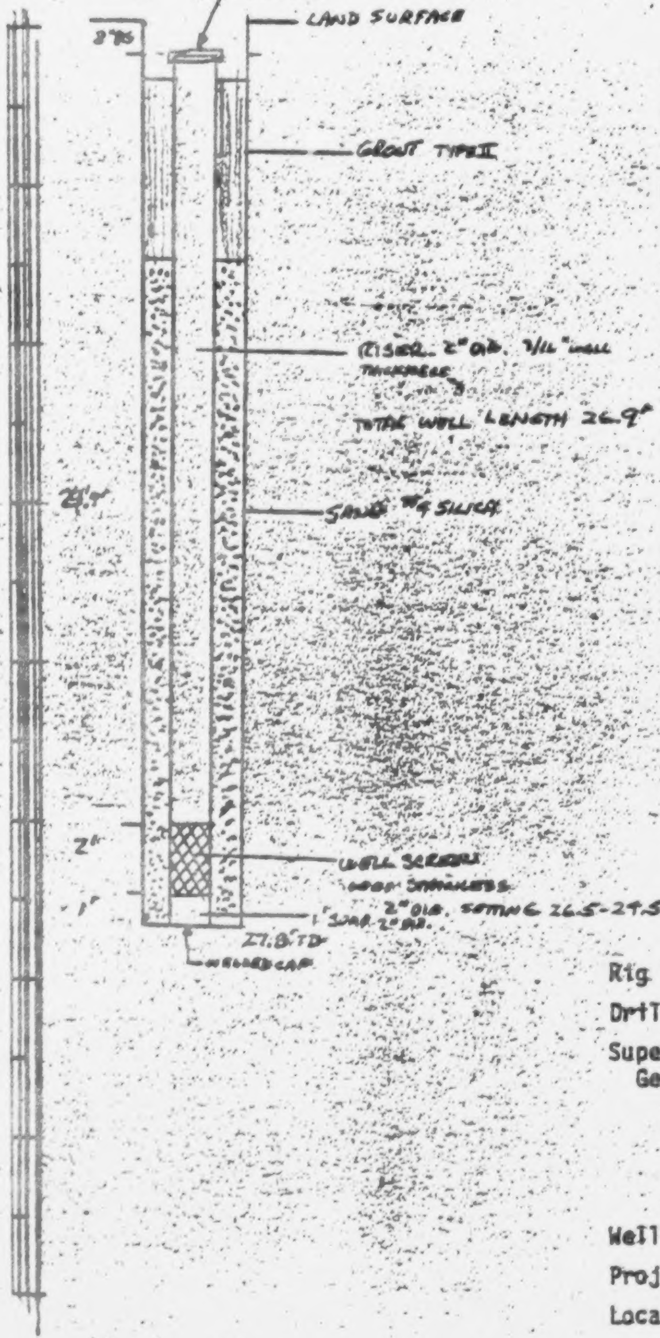
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Top of cap approx. 8" below grade

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Mobile B-56

Driller Pat Parmentier

Supervisory Geologist Ed Tokarski

Well No. 31-A

Project Love Canal

Location off 96th St. near apartment complex

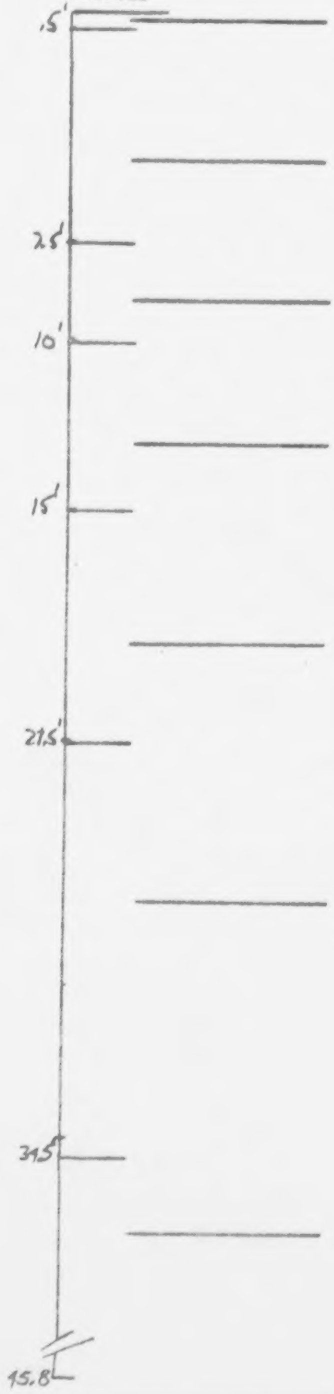
Date 9/20/80

Prepared By: Ed Tokarski

Scale: 1"=5'

WELL LOG

PROFILE



DESCRIPTION

TOPSOIL - VEGETATION. BROWN DRY AND LUMPY.

SANDY LOAM DRY WITH PEBBLES.

SILTY CLAY. BROWN RED - DRY.

SILTY CLAY - BROWN RED - MOIST

SILTY CLAY - RED. WET.

TILL RED MATRIX WITH SAND AND GRAVEL.

DOLOMITE - GREY WITH CALCITE AND GYPSUM STRINGERS.

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 31-B

LOCATION Unit 721 & Apt. 2

	Date	Time
DRILLING STARTED	9/19/80	1615
DRILLING COMPLETED	9/22/80	1600

DRILLER Joe Jensen

GEOLOGIST Ed Tokarski & Charlie Kufs

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573.1

X.

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES 16-20

WELL DATA

HOLE DIAMETER 6"-3"

HOLE DEPTH 45.8'

CASING DIAMETER 4"

CASING LENGTH 34.5'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 34.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 6.3'

DATE MEASURED 9/22/80 @ 1615

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

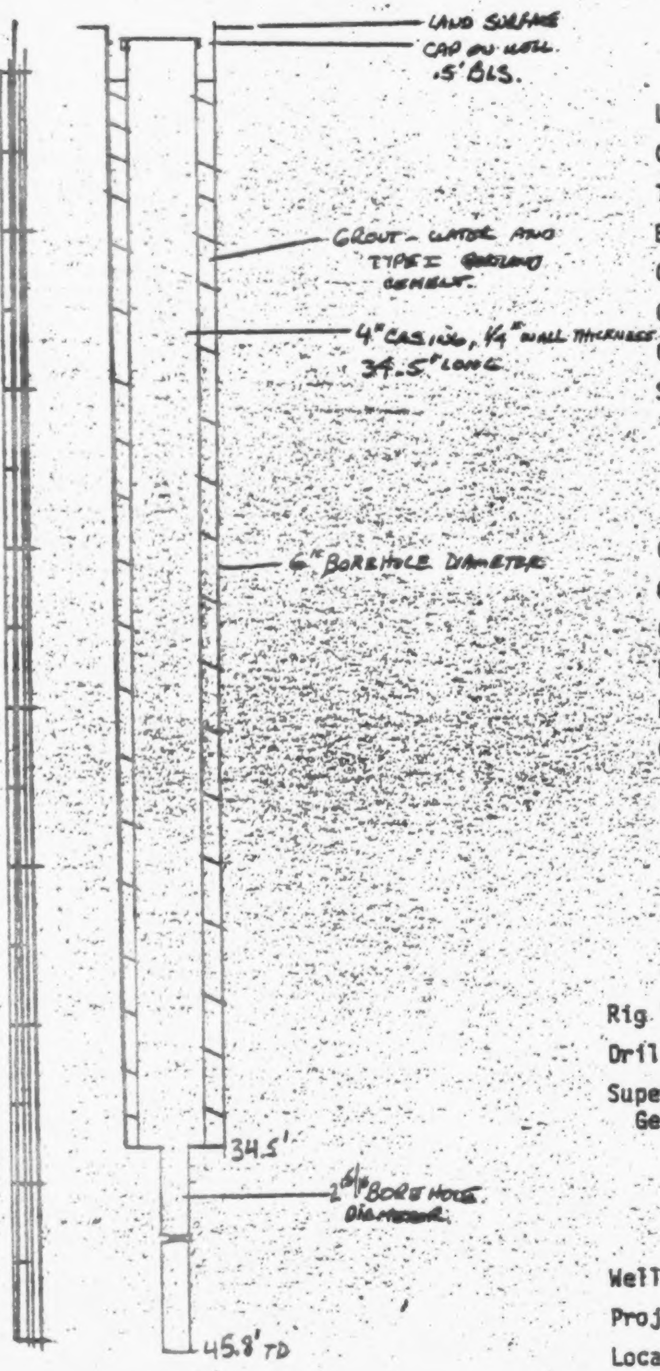
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING


LAND SURFACE
CAP ON WELL .5' BLS.
GROUT - WATER AND TYPE I PORTLAND CEMENT.
4" CASING, 1/4" WALL THICKNESS 34.5' LONG
6" BOREHOLE DIAMETER
34.5'
2 5/8" BORE HOLE DIAMETER
45.8' TD

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Ed Tokarski

Well No. 31-B

Project Love Canal

Location off 96th St. near apt. complex

Date 9/22/80

Prepared By: Ed Tokarski

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION

0

← SILTY LOAM

1'

← BROWN YELLOW SILTY CLAY

2.5'

← BROWNISH GRAY SILTY CLAY

3'

← GRAY BROWN YELLOW

4'

← GRAY REDDISH BROWN SILTY CLAY

7'

← GRAY REDDISH BROWN SILTY CLAY MOIST

9.5'

← GRAY REDDISH BROWN SILTY CLAY WET PLASTIC

26'

← TILL

27.2'

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 32-A

LOCATION SE corner of 93rd St. and Read Ave.

	Date	Time
DRILLING STARTED	9/18/80	1545
DRILLING COMPLETED	9/18/80	1750

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573.2

TOPO POSITION flat lying

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 54-55

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 27.2'

CASING DIAMETER 2"

CASING LENGTH 26.5'

SCREEN DIAMETER 2"

SCREEN SETTING 25'-23'

SCREEN SLOT/TYPE .0001" Johnson stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

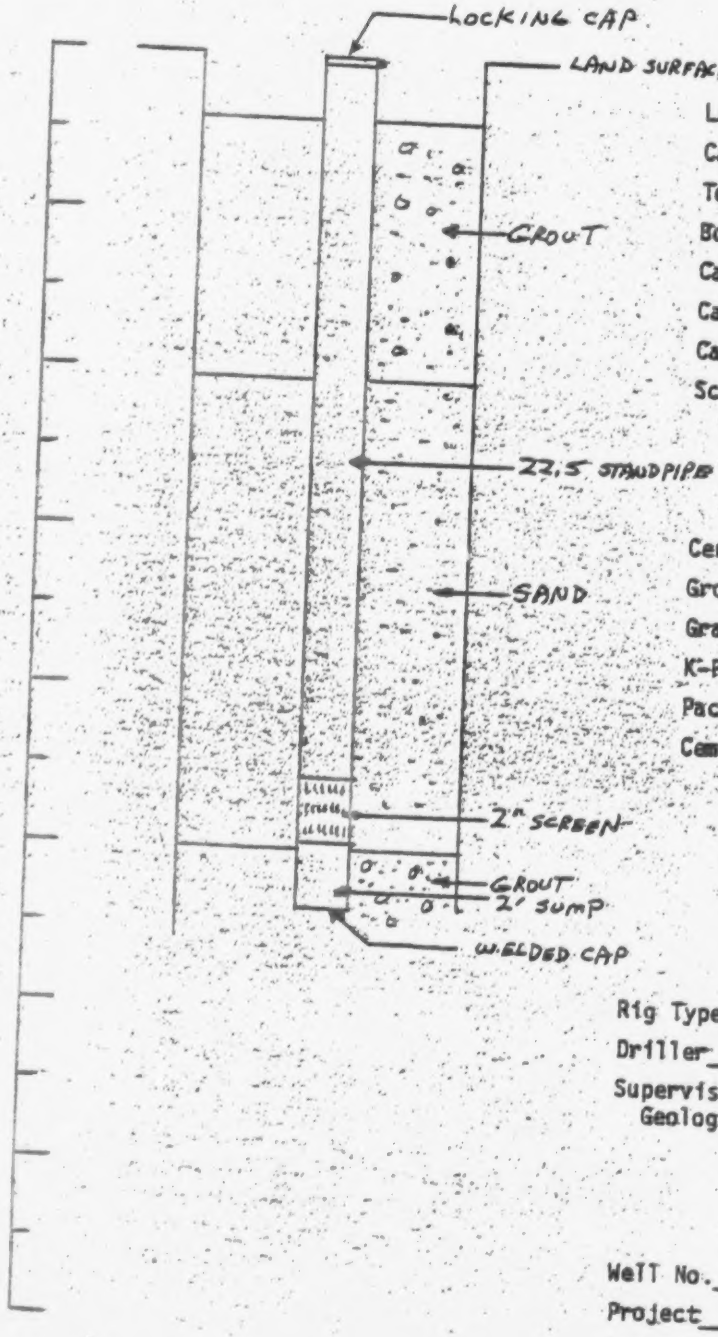
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S — .5'
Total Depth 27.2'
Borehole Diameter 6"
Casing Diameter 2"
Casing Thickness 3/16"
Casing Lengths 26.5'
Screen Data
  Material Stainless steel
  Diameter 2"
  Slot Openings .001" .001"
  Settings 25'-23'
Centralizers
Grout Type Portland Type I
Gravel Pack #4 Quartz Sand
K-Fittings
Packers
Cement Baskets

X

Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist Dennis Stanczuk

Well No. 32 A
Project Love Canal
Location SE corner of 93rd St. and Read Ave.
Date 9/18/80

Prepared By: DENNIS STANCZUK
Scale: 1 INCH = 5 FEET

WELL LOG

PROFILE DESCRIPTION

0

SILTY LOAM

1'

GRAY BROWN SILTY CLAY

2'

BROWNISH YELLOW SILTY CLAY

3.5'

YELLOWISH BROWN SILTY CLAY

6'

GRAYISH REDDISH BROWN SILTY CLAY MOIST

7.5'

REDDISH BROWN SILTY CLAY MOIST

10'

REDDISH BROWN CLAY, MOIST

12'

GRAYISH REDDISH BROWN CLAY VERY WET, PLASTIC

26'

TILL

~~[illegible]~~

36.3'

DOLOMITE

42.6'

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 32-B

LOCATION SE corner of 93rd St. and Read Ave.

	Date	Time
DRILLING STARTED	9/17/80	1255
DRILLING COMPLETED	9/20/80	1520

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT ground level

R.P. ELEVATION not surveyed 573.2

TOPO POSITION flat lying

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 49-53, 62

WELL DATA

HOLE DIAMETER 6" Auger/2 15/16

HOLE DEPTH 36.3'/42.6

CASING DIAMETER 4"

CASING LENGTH 35.5'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 36.3'

PUMP TEST DATA

STATIC DEPTH TO WATER 8.54'

DATE MEASURED 9/17/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

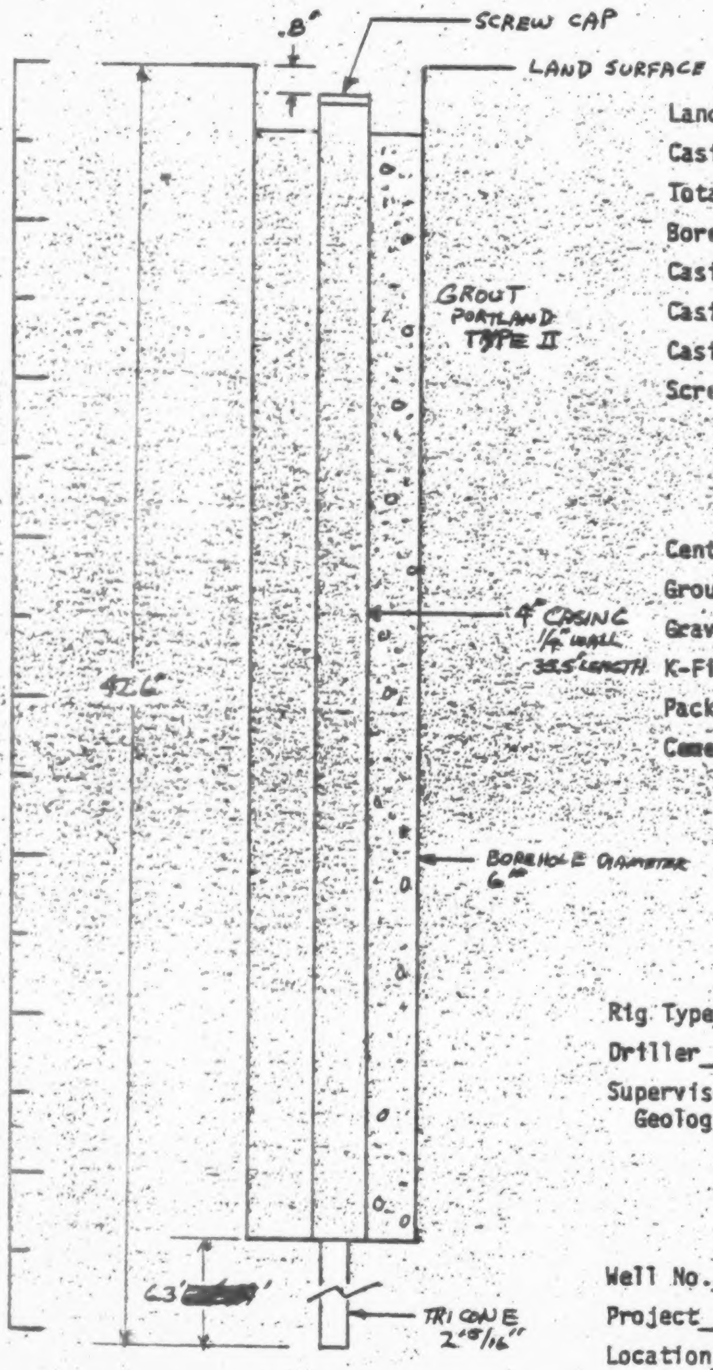
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S -.8"
Total Depth 36.3"
Borehole Diameter 6" Auger
Casing Diameter 4"
Casing Thickness ¼"
Casing Lengths 35.5'
Screen Data N/A
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type Portland TypeII
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist Dennis Stanczuk

Well No. 2232-B
Project Love Canal
Location SE corner of 93rd St. and Read Ave.

Date 9/17/80

Prepared By: DENNIS STANCZUK
Scale: 1 INCH = 5 FEET

WELL LOG

PROFILE DESCRIPTION

0
1' ← SILTY CLAYEY LOAM
2' ← GRAY BROWN SILTY CLAY
3.5' ← YELLOWISH GRAY BROWN SILTY CLAY
← GRAY BROWN SILTY CLAY
6'
7' ← YELLOWISH GRAY BROWN SILTY CLAY
8' ← GRAYISH REDDISH BROWN SILTY CLAY
9' ← REDDISH BROWN SILTY CLAY MOIST
10' ← REDDISH GRAY SILTY CLAY MOIST
← REDDISH GRAY CLAY MOIST PLASTIC
19'
← SILTY CLAYEY TILL PEBBLE AGRIGATE
22.2

PROJECT Love Canal
OWNER City of Niagara Falls
WELL NO. 33-A
LOCATION East of apartment complex10

	Date	Time
DRILLING STARTED	9/20/80	1400
DRILLING COMPLETED	9/20/80	1600

DRILLER Ed Cole
GEOLOGIST DENNIS STANCZUK
RIG TYPE Acker AD-2
REFERENCE POINT land surface
R.P. ELEVATION not surveyed 573.6
TOPO POSITION flat lying
PROFILE BY Dennis Stanczuk
FIELD BOOK NO. 2 PAGES 60

WELL DATA

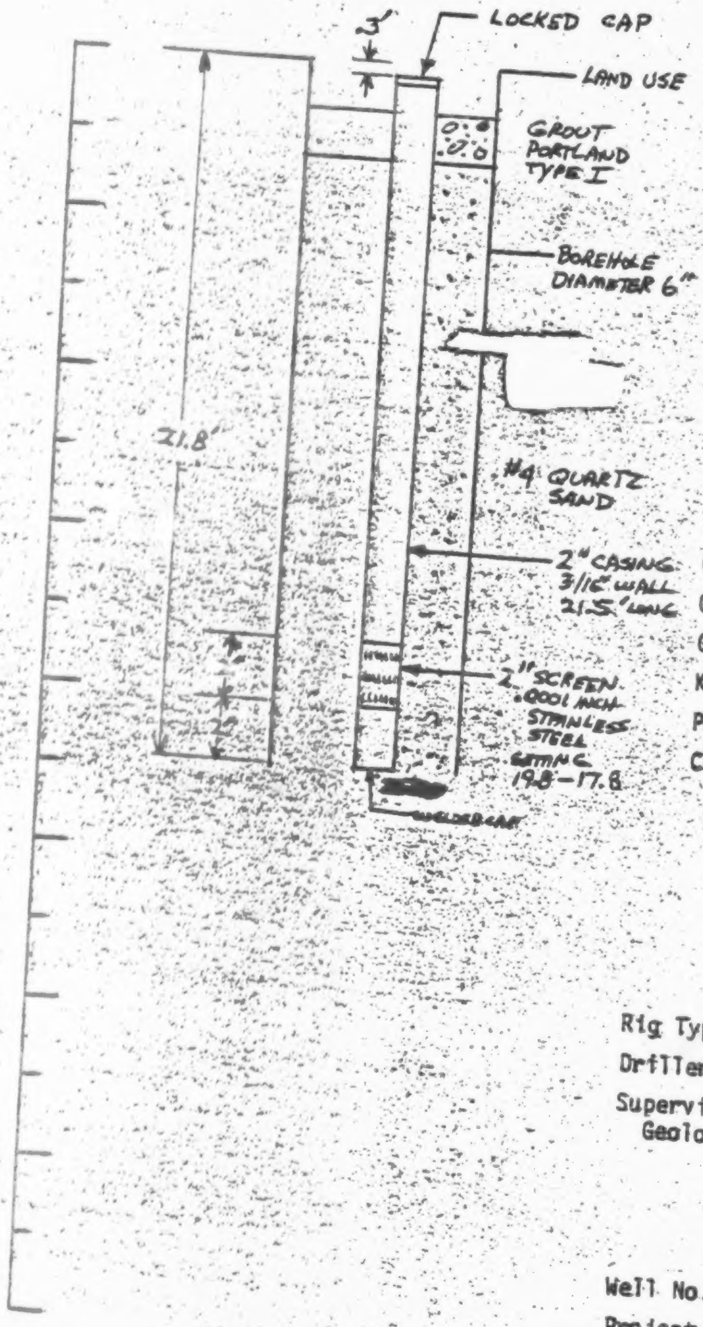
HOLE DIAMETER 6"
HOLE DEPTH 22'
CASING DIAMETER 2"
CASING LENGTH 21.5'
SCREEN DIAMETER 2"
SCREEN SETTING 19.8'-17.8'
SCREEN SLOT/TYPE ~~.001~~ .0001" Johnson stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER
DATE MEASURED
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist Dennis Stanczuk

Well No. 33-A
Project Love Canal
Location East of apartment Complex 10
Date 9/20/80

Prepared By: DENNIS STANCZUK
Scale: 1 INCH = 5 FEET

WELL LOG

PROFILE	DESCRIPTION
0'	SILTY CLAY LOAM
2'	GRAY BROWN SILTY CLAY BRICK FRAGMENTS
5'	YELLOWISH GRAY BROWN SILTY CLAY
6'	YELLOWISH GRAY BROWN SILTY CLAY MOIST
7'	REDDISH GRAY BROWN SILTY CLAY MOIST
9'	GRAY BROWN SILTY CLAY MOIST
10'	REDDISH GRAY BROWN SILTY CLAY
19'	SOFT TILL
21'	SILTY/CLAYEY HARD TILL
36.3'	DOLOMITE
37.3'	
41.25'	

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 33-B

LOCATION 54 meters west of curb line of
Read Ave., south of court 9

	Date	Time
DRILLING STARTED	9/19/80	0845
DRILLING COMPLETED	9/22/80	0930

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573.6

TOPO POSITION flat lying

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 56-59, 63-64

WELL DATA

HOLE DIAMETER 6" auger/ 5 5/8" roller bit/ 2 15/16" roller bit

HOLE DEPTH 36.31'/ 37.3'/ 41.25'

CASING DIAMETER 4"

CASING LENGTH 36.7'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

Depth to bedrock 36.3'

PUMP TEST DATA

STATIC DEPTH TO WATER 27.9'

DATE MEASURED 9/19/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

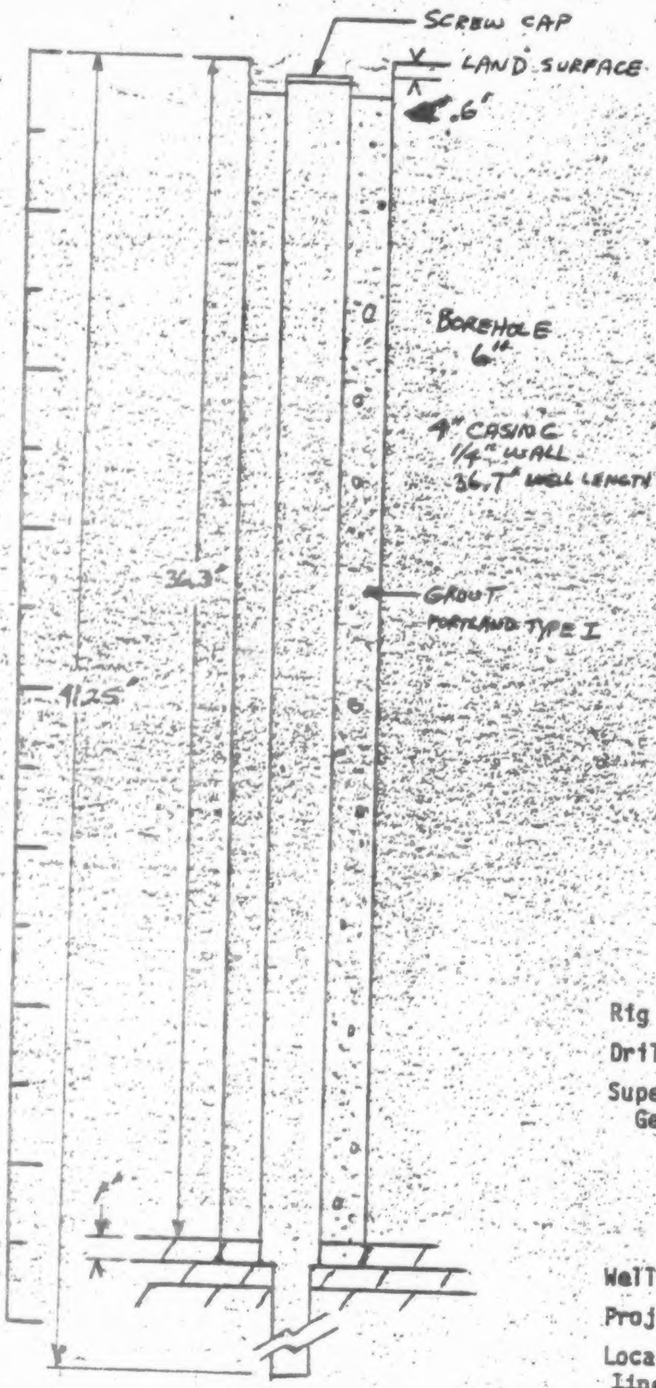
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S .3'
Total Depth 41.25'
Borehole Diameter 6" auger/ 2 15/16"tricone
Casing Diameter 4"
Casing Thickness ½"
Casing Lengths 36.5'
Screen Data N/A
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type Portland
Gravel Pack 0 Silica Sand
K-Fittings
Packers
Cement Baskets

Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist Dennis Stanczuk

Well No. 33-B
Project Love Canal
Location 54 meters west of curb line of Read Ave., south of court 9
Date 9/19/80

Prepared By: Dennis Stanczuk
Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
LAND SURFACE	DARK BROWN AND YELLOW BROWN CLAY AND CLAY LOAM FILL
2'	BRIGHT YELLOW BROWN LOAMY FINE SAND DRY
4'	PALE BROWNISH GRAY SANDY CLAY LOAM, DRY
5'	PALE RED BROWN MOTTLED WITH GRAY
12'	GRAY BROWN AND RED BROWN SILTY CLAY TO CLAY, VERY MOIST TO WET, VERY PLASTIC, VERY STICKY
22'	GLACIAL TILL, VERY CLAYEY, GRAVELLY COBBLY
30'	

SCALE: 1" = 5'

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 34-A

LOCATION Between Apt. complexes 3 & 4

	Date	Time
DRILLING STARTED	9/19/80	1138
DRILLING COMPLETED	9/19/80	1418

DRILLER Pat Parmentier

GEOLOGIST Phil Spooner

RIG TYPE Mobile B-56

REFERENCE POINT land surface

R.P. ELEVATION not surveyed

TOPO POSITION flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 25-27

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 30'

CASING DIAMETER 2"

CASING LENGTH 30'

SCREEN DIAMETER 2"

SCREEN SETTING 28'-~~[illegible]~~' 27 X

SCREEN SLOT/TYPE .~~[illegible]~~ Stainless

.0001" X

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/19/80 @ 1420

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

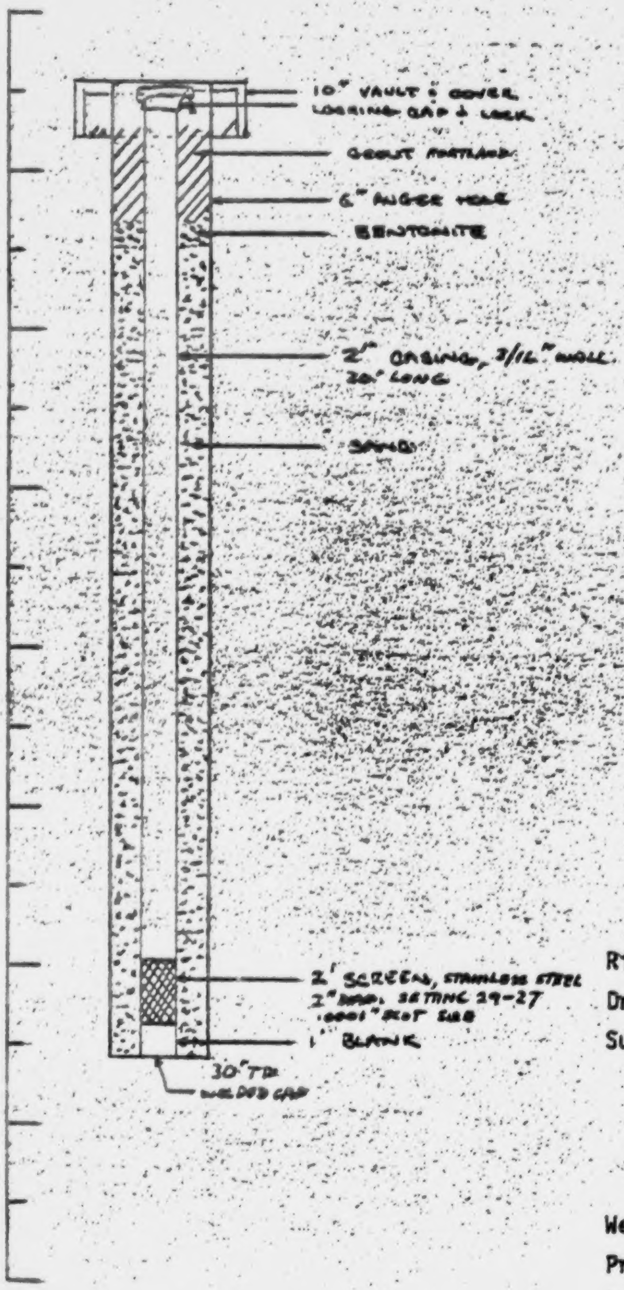
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Phil Spooner

Well No. 34-A
Project Love Canal
Location Between apt. complexes 3 & 4
Date 9/19/80

Prepared By: Phil Spooner
Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
LAND SURFACE	DARK BROWN AND YELLOW BROWN CLAY AND CLAY LOAM, FILL
2'	BRIGHT YELLOW BROWN LOAMY FINE SAND, DRY
4'	PALE BROWNISH GRAY SANDY CLAY LOAM, DRY
5'	PALE RED BROWN MOTTLED WITH GRAY
12'	GRAY BROWN AND RED BROWN SILTY CLAY, VERY MOIST TO WET, VERY PLASTIC, VERY STICKY
22'	GLACIAL TILL, VERY CLAYEY, GRAVELLY, VERY COBBLY
35½'	DOLOMITE
40.1'	

SCALE: 1" = 5'

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 34-B

LOCATION Between Apt. complexes 3 & 4

	Date	Time
DRILLING STARTED	9/18/80	1420
DRILLING COMPLETED	9/23/80	1100

DRILLER Joe Genovese

GEOLOGIST Phil Spooner

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not surveyed

TOPO POSITION flat-lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 23-28,33-35

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 40.1'

CASING DIAMETER 4"

CASING LENGTH 35'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none

Depth to bedrock 35.2'

PUMP TEST DATA

STATIC DEPTH TO WATER 13.1'

DATE MEASURED 9/23/80 @ 1112

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

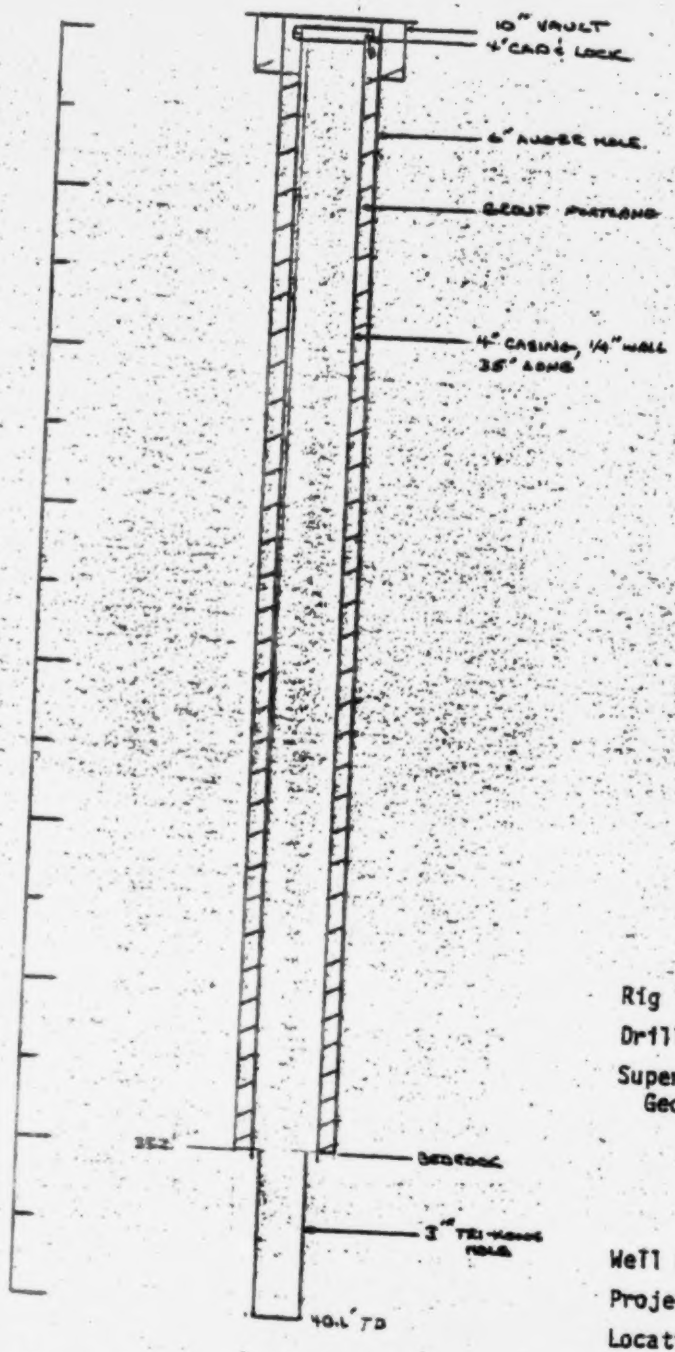
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45

Driller Joe Genovese

Supervisory Geologist Phil Spooner

Well No. 34-B

Project Love Canal

Location Between apt. complexes 3 & 4

Prepared By: Phil Spooner

Scale: 1"=5'

Date 9/23/80

WELL LOG

PROFILE

DESCRIPTION

fill - yellow to brown yellow dirt, powdery concrete peices, glass

Clay - brown to yellow brown, moist

clay - brown to red. brown - wet and sticky

till - pebbles in sandy silt matrix

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 35-A

LOCATION East of 96th St., across from Court 4

	Date	Time
DRILLING STARTED	9/17/80	1510
DRILLING COMPLETED	9/17/80	1624

DRILLER Roger Logel

GEOLOGIST David Robertson

RIG TYPE CME-45C

REFERENCE POINT ground level

R.P. ELEVATION not yet surveyed 572.6

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 7 PAGES 60-61

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 25'

CASING DIAMETER 2"

CASING LENGTH 24.5'

SCREEN DIAMETER 2"

SCREEN SETTING 24' ~~23~~' 22

SCREEN SLOT/TYPE ~~100~~ slot - stainless steel .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/17/80 @ 1730

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

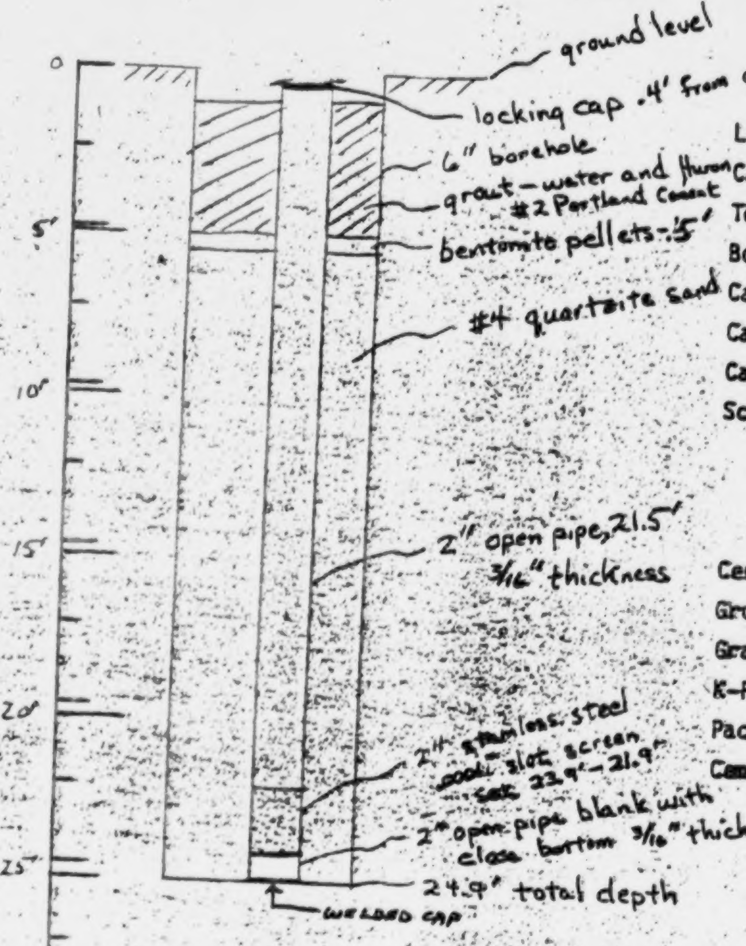
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

AS-BUILT DRAWING


0
5'
10'
15'
20'
25'
ground level
locking cap .4' from ground level
6" borehole
grout - water and Huron #2 Portland Cement
bentonite pellets -.5'
#4 quartzite sand
2" open pipe, 21.5'
3/16" thickness
2" stainless steel .001 slot screen set 23.9' - 21.9'
2" open pipe blank with close bottom 3/16" thick
24.9' total depth
WELDED CAP

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist David Robertson

Well No. 35-A

Project Love Canal

Location East of 96th St. across from Complex 4

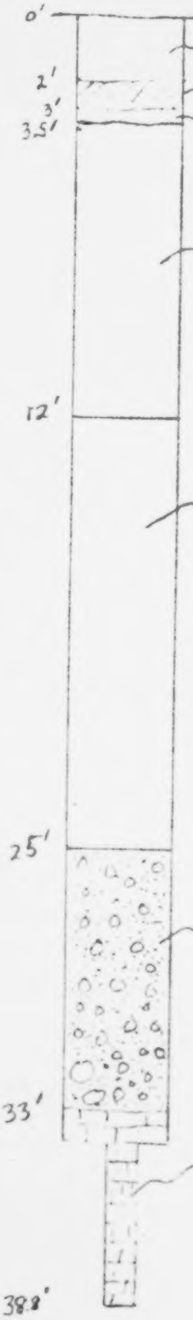
Date 9/17/80

Prepared By: David Robertson

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



rock fill - glass, nails, stones + dirt

concrete slab

brown to yellow powdery fill

clay - brown to reddish brown, moist

clay - grey brown, wet gritty with sand and silt, pebbles interspersed

till - stones and pebbles in fine silty clay light brown matrix

Lockport Dolomite - grey dolomite with seams of calcite and gypsum

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 35-B

LOCATION East of 96th St., across from Court 4

	Date	Time
DRILLING STARTED	9/16/80	1535
DRILLING COMPLETED	9/22/80	0945

DRILLER Roger Logel

GEOLOGIST David Robertson

RIG TYPE CME-45C

REFERENCE POINT ground level

R.P. ELEVATION not yet surveyed 572.6

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 7 **PAGES** 55-59

WELL DATA

HOLE DIAMETER 6"-2"

HOLE DEPTH 38.8'

CASING DIAMETER 4"

CASING LENGTH 33.5'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none

Depth to bedrock 33'

PUMP TEST DATA

STATIC DEPTH TO WATER 8.3' BLS

DATE MEASURED 9/22/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

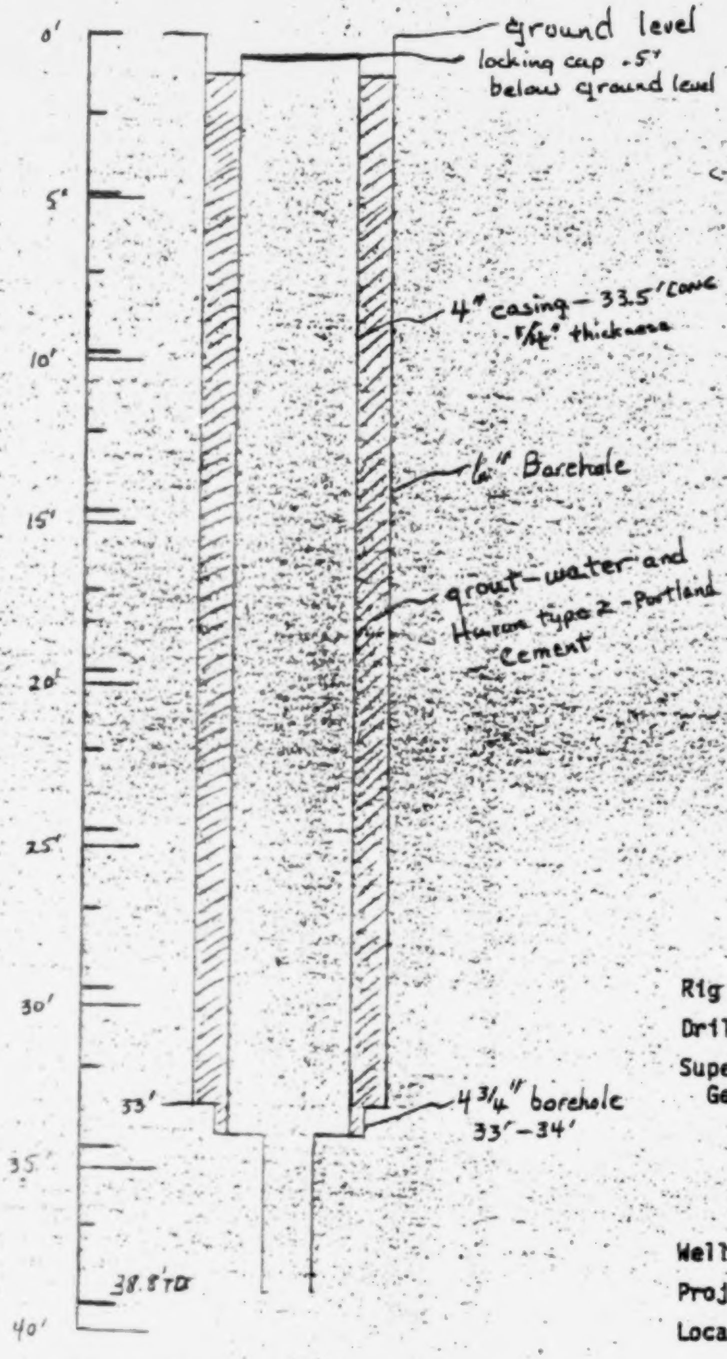
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C
Driller Roger Logel
Supervisory Geologist David Robertson

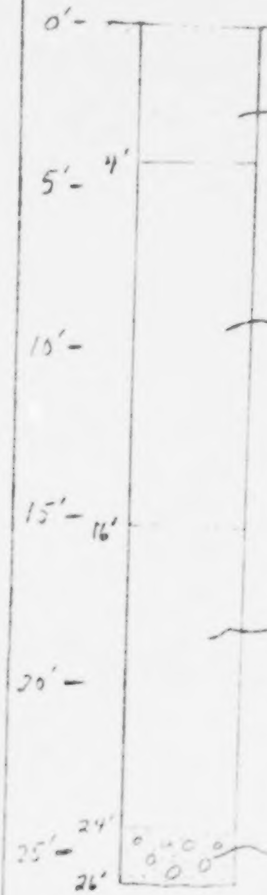
Well No. 35-B
Project Love Canal
Location East of 96th St., across from Complex 4

Prepared By: David Robertson
Scale: 1"=5'

Date 9/17/80

WELL LOG

PROFILE DESCRIPTION



fill - brown to yellow brown powdery dirt with some rocks

clay - brown, moist

clay - brown to grey brown, wet

till - stones and pebbles in brown to red brown sandy clay matrix

PROJECT Love Canal
OWNER City of Niagara Falls
WELL NO. 36-A
LOCATION south of Read St. between apartment complexes 5 & 7

	Date	Time
DRILLING STARTED	9/19/80	0739
DRILLING COMPLETED	9/19/80	0806

DRILLER Bill Logel
GEOLOGIST David Robertson
RIG TYPE CME-45C
REFERENCE POINT ground level
R.P. ELEVATION not yet surveyed 573.9
TOPO POSITION flat lying
PROFILE BY David Robertson
FIELD BOOK NO. 7 PAGES 64-65

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 26'
CASING DIAMETER 2"
CASING LENGTH 25'
SCREEN DIAMETER 2"
SCREEN SETTING 24'-22'
SCREEN SLOT/TYPE ~~100~~ slot - stainless steel .0001"

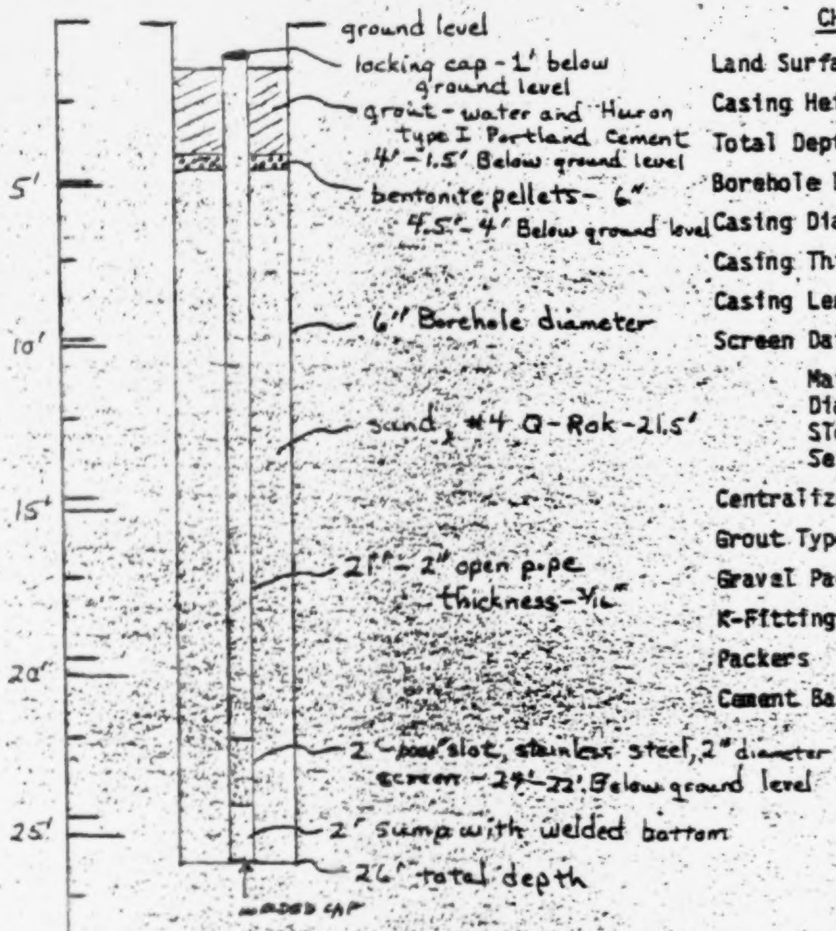
PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 9/19/80 @ 0852
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Well completed with locking cap

AS-BUILT DRAWING



ground level
locking cap - 1' below ground level
grout - water and Huron type I Portland Cement 4' - 1.5' Below ground level
bentonite pellets - 6" 4.5' - 4' Below ground level
6" Borehole diameter
sand, #4 Q-Rok - 21.5'
21' - 2" open pipe thickness - 3/16"
2 - slot, stainless steel, 2" diameter screen - 24' - 22'. Below ground level
2' sump with welded bottom
26' total depth
WELDED CAP
5'
10'
15'
20'
25'
30'

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
- Material
- Diameter
- Slot Openings
- Settings

Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C
Driller = Bill Logel
Supervisory Geologist David Robertson

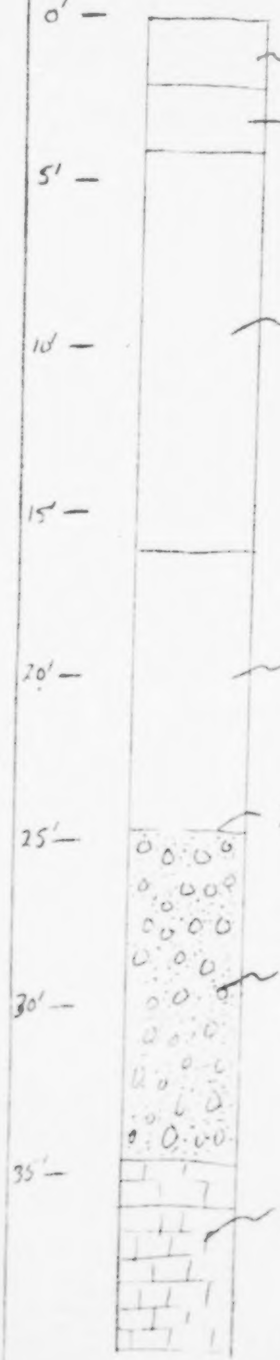
Well No. 36-A
Project Love Canal
Location south of Read St. between apt. complexes 5 & 7

Date 9/19/80

Prepared By: David Robertson
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



fill - yellow to yellow brown

fill - brown to orange brown with stones

clay - brown and moist

clay - brown to greyish brown, wet

24'

till - stones and pebbles in silty brown matrix

lockport dolomite - grey dolomite with some calcite

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 36-B

LOCATION S. Read St., between apt. complexes 5 & 7

	Date	Time
DRILLING STARTED	9/18/80	0950
DRILLING COMPLETED	9/22/80	1450

DRILLER Roger Logel

GEOLOGIST David Robertson

RIG TYPE CME-45C

REFERENCE POINT ground level

R.P. ELEVATION not yet surveyed 573.9

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 7 PAGES 61-64

WELL DATA

HOLE DIAMETER 6" - 4" - 2"

HOLE DEPTH 39.3'

CASING DIAMETER 4"

CASING LENGTH 35.0'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

Depth to bedrock 34.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 1' BLS

DATE MEASURED 9/22/80 @ 1044

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

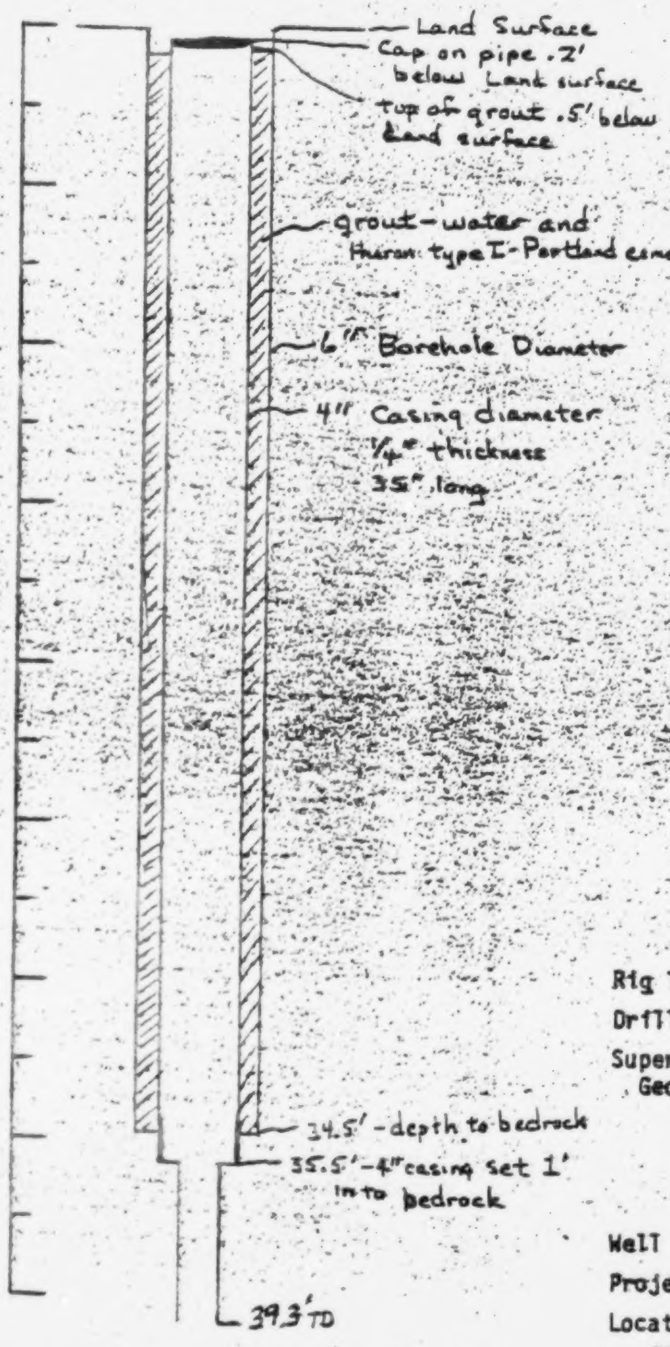
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING


Land Surface
Cap on pipe .2' below Land surface
top of grout .5' below Land surface
grout-water and Huron type I-Portland cement
6" Borehole Diameter
4" Casing diameter
1/4" thickness
35' long
34.5'-depth to bedrock
35.5'-4" casing set 1' into bedrock
39.3' TD

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

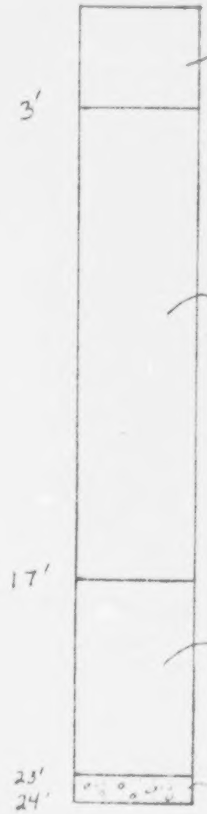
Rig Type CME-45C
Driller Roger Logel
Supervisory Geologist David Robertson

Well No. 36-B
Project Love Canal
Location D. Read St. between apt. complexes 5 & 7
Date 9/18/80

Prepared By: David Robertson
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



fill - light brown to yellow brown, powdery

clay - moist and brown

clay - wet, grey brown

till - yellow brown sand with dolomite pebbles

PROJECT Love Canal
OWNER City of Niagara Falls
WELL NO. 37-A
LOCATION East of 96th St. across from apt. 470 - complex 5

	Date	Time
DRILLING STARTED	9/16/80	0956
DRILLING COMPLETED	9/16/80	1021

DRILLER Roger Logel
GEOLOGIST David Robertson
RIG TYPE CME-45C
REFERENCE POINT ground level
R.P. ELEVATION ~~not yet surveyed~~ 573.4
TOPO POSITION flat lying
PROFILE BY David Robertson
FIELD BOOK NO. 7 PAGES 53-54

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 24'
CASING DIAMETER 2"
CASING LENGTH 23.5'
SCREEN DIAMETER 2"
SCREEN SETTING 23.0'-21.0'
SCREEN SLOT/TYPE ~~100~~ slot - SS .0001"

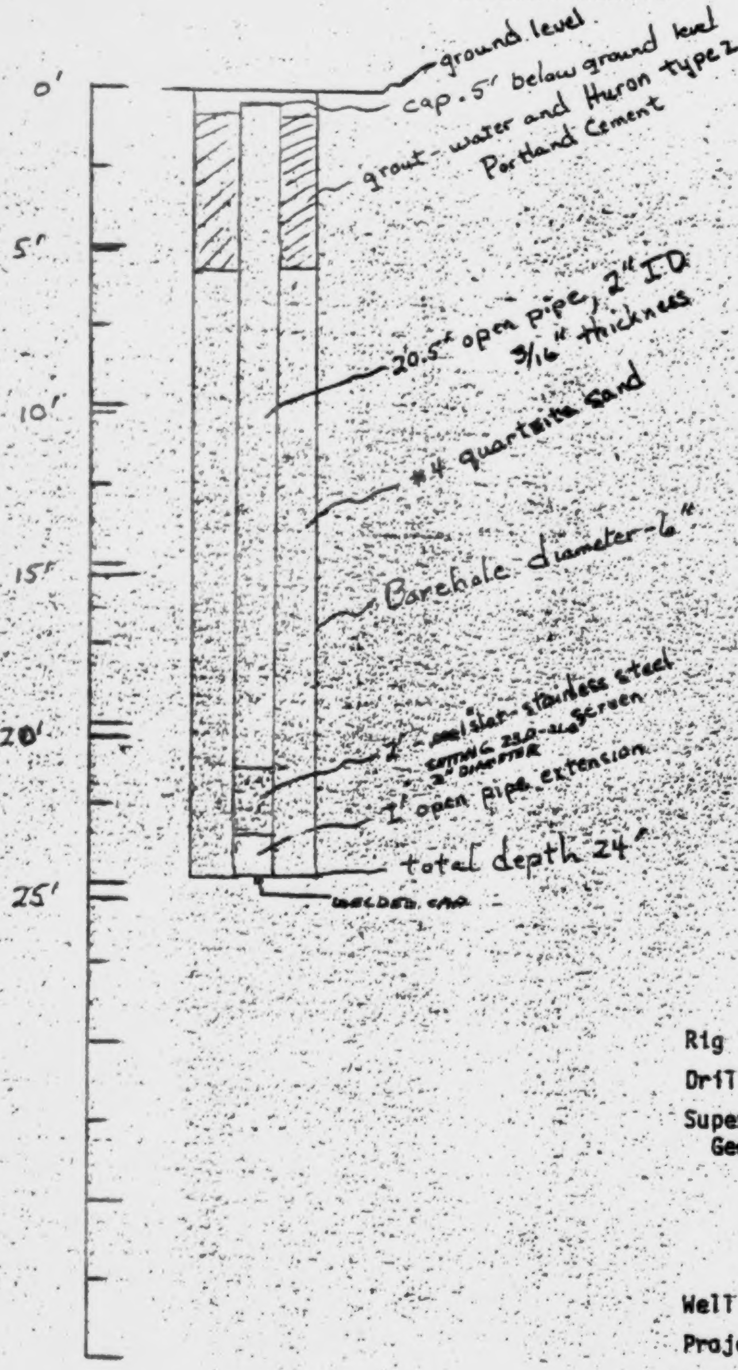
PUMP TEST DATA

STATIC DEPTH TO WATER 24' - damp
DATE MEASURED 9/16/80 @ 1047
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

AS-BUILT DRAWING


0'
5'
10'
15'
20'
25'
ground level
cap .5' below ground level
grout - water and Huron type 2 Portland Cement
20.5' open pipe, 2" I.D. 3/16" thickness
#4 quartzite sand
Borehole diameter - 6"
2' - [illegible] slot - stainless steel screen
SETTING 22.0-24.0
2" DIAMETER
1' open pipe extension
total depth 24'
WELDED CAP

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

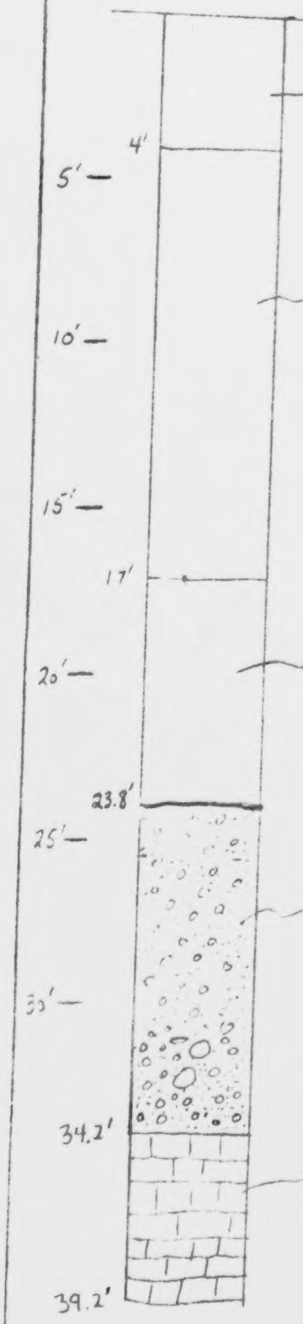
Rig Type CMZ-45C
Driller Roger Logel
Supervisory Geologist David Robertson

Well No. 37-A
Project Love Canal
Location East of 96th St. across from apt. 470 - complex 5
Date 9/16/80

Prepared By: David Robertson
Scale: 1"=5'

WELL LOG

PROFILE



DESCRIPTION

ground level

fill - yellowish brown dirt, powdery

clay - brown to light brown, moist

clay - brown to grey brown, wet and sticky, gritty with yellow sand

till - rounded pebbles and stones in clay matrix, hard

Lockport dolomite - grey porous dolomite with calcite and gypsum layers

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 37-B

LOCATION East of 96th St. across from apt. 470 - complex 5

	Date	Time
DRILLING STARTED	9/15/80	0820
DRILLING COMPLETED	9/16/80	0904

DRILLER Roger Logel

GEOLOGIST David Robertson

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION ~~not yet surveyed~~ 573.4

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 7 PAGES 47-55

WELL DATA

HOLE DIAMETER 6" - 2"

HOLE DEPTH 34.2' - 39.2'

CASING DIAMETER 2"

CASING LENGTH 34.8'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none

DEPTH TO BEDROCK 34.2'

PUMP TEST DATA

STATIC DEPTH TO WATER 8.8'

DATE MEASURED 9/16/80 @ 1237

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

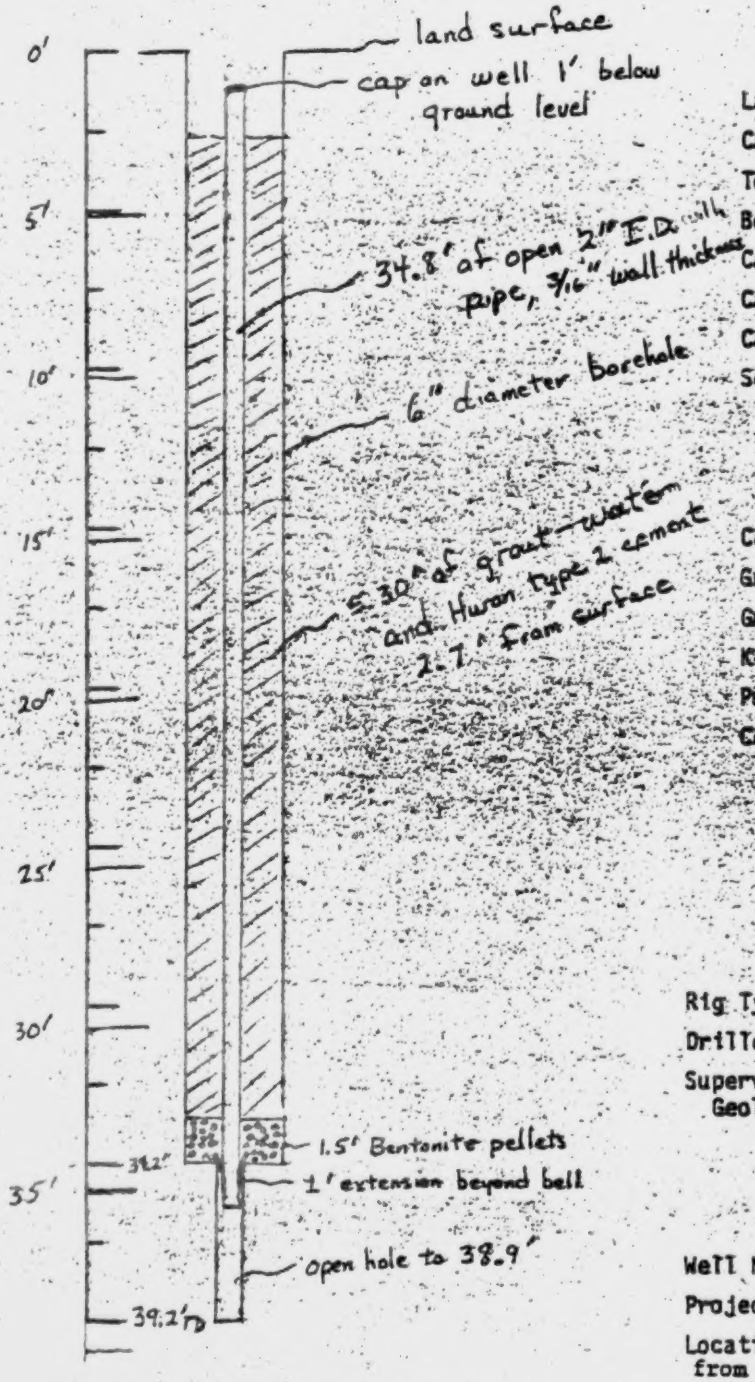
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

AS-BUILT DRAWING


0'
5'
10'
15'
20'
25'
30'
35'
land surface
cap on well 1' below ground level
34.8' of open 2" I.D. with pipe, 3/16" wall thickness
6" diameter borehole
≤ 30' of grout-water and Huron type 2 cement 2.7' from surface
1.5' Bentonite pellets
33.2'
1' extension beyond bell
open hole to 38.9'
39.2' TD

CHECKLIST

Land Surface Elevation
Casing Height Above L-S - 1.0'
Total Depth -
Borehole Diameter -
Casing Diameter -
Casing Thickness -
Casing Lengths -
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers -
Grout Type-
Gravel Pack
K-Fittings-
Packers-
Cement Baskets

Rig Type CME-45C
Driller Roger Logel
Supervisory Geologist David Robertson

Well No. 37-B
Project Love Canal
Location East of 96th St. across from apt. 470 - complex 5
Date 9/16/80

Prepared By: David Robertson
Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
LAND SURFACE	OLIVE GRAY AND DARK GRAY BROWN CLAY FIRM, MOIST.
1.5'	LIGHT OLIVE BROWN, LOAMY FINE SAND MOIST, FRIABLE
2'	DARK GRAY BROWN CLAY, FIRM, MOIST
2.5'	LIGHT OLIVE BROWN LOAMY FINE SAND, MOIST, FRIABLE
3.8'	BROWN, MOTTLED WITH GRAY, CLAY, MOIST, FIRM, PLASTIC.
16'	GRAYISH BROWN CLAY TO SILTY CLAY, VERY MOIST, VERY PLASTIC
24.2'	GRAYISH BROWN SILTY CLAY, WET, VERY PLASTIC, MUCH ROUNDED GRAVEL
28'	

SCALE: 1" = 5'

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 38-A

LOCATION 180' west of 96th St. and 150' north of Frontier Ave.

	Date	Time
DRILLING STARTED	9/18/80	0750
DRILLING COMPLETED	9/18/80	1143

DRILLER Joe Genovese

GEOLOGIST Phil Spooner

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573

TOPO POSITION flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 22

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 28'

CASING DIAMETER 2"

CASING LENGTH 28'

SCREEN DIAMETER 2"

SCREEN SETTING 25'-27'

SCREEN SLOT/TYPE .0001" Stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/18/80 0954

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

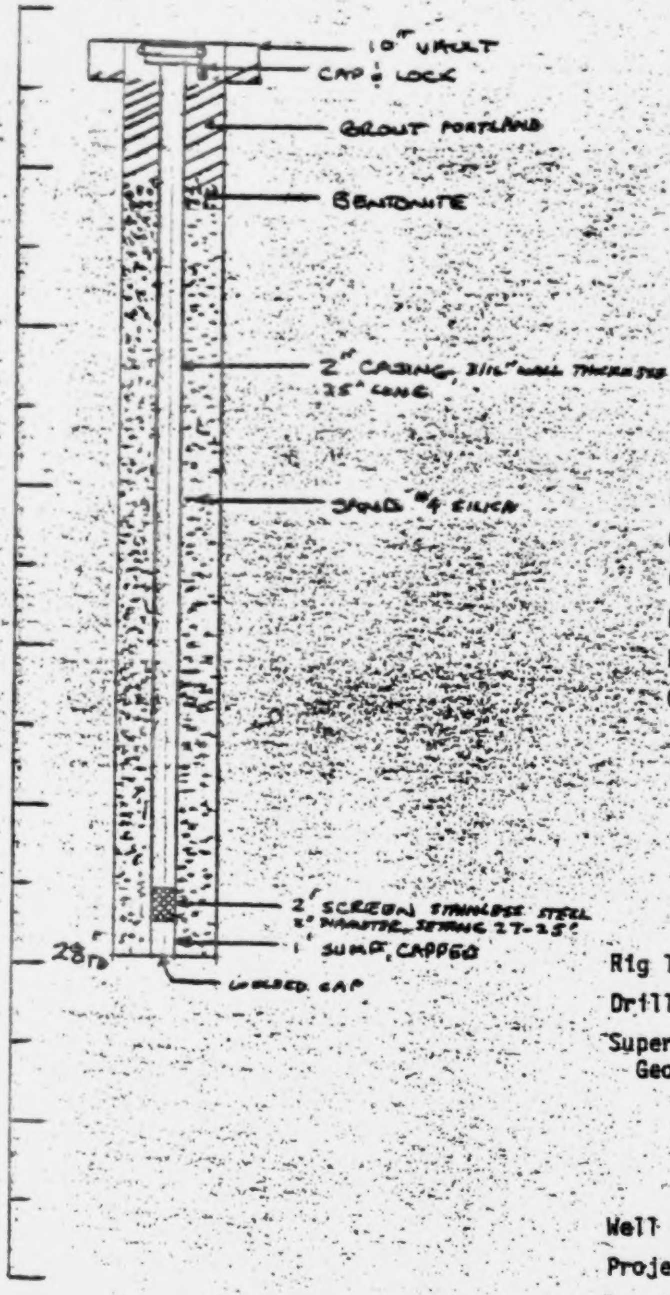
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45
Driller Joe Genovese
Supervisory Geologist Phil Spooner

Well No. 38-A
Project Love Canal
Location 180' west of 96th St. and 150' north of Frontier Ave.

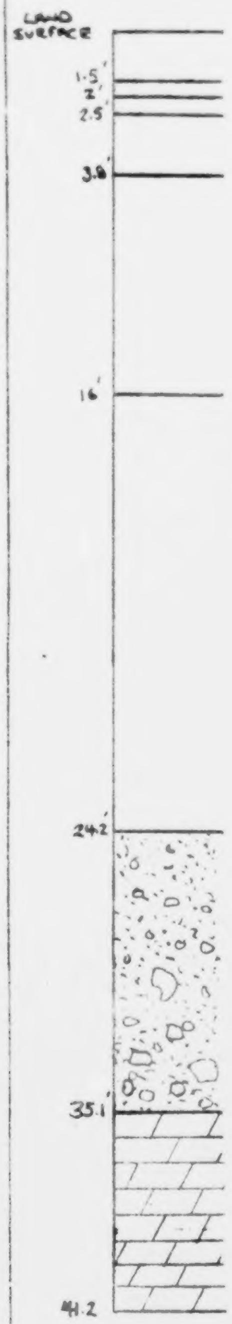
Prepared By: Phil Spooner
Scale: 1"=5'

Date 9/18/80

WELL LOG

PROFILE

DESCRIPTION



OLIVE GRAY AND DARK GRAY BROWN CLAY, FIRM, MOIST

LIGHT OLIVE BROWN LOAMY FINE SAND MOIST, FRIABLE

DARK GRAY BROWN CLAY FIRM, MOIST

LIGHT OLIVE BROWN LOAMY FINE SAND, MOIST, FRIABLE

BROWN MOTTLED WITH GRAY, CLAY, MOIST, FIRM, PLASTIC

GRAYISH BROWN CLAY TO SILTY CLAY, VERY MOIST, VERY PLASTIC

GLACIAL TILL GRAYISH BROWN SILTY CLAY, GRAVELLY, COBBLY, WET, VERY PLASTIC

DOLOMITE

SCALE: 1" = 5'

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 38-B

LOCATION 280' west of centerline 96th St. and 160' north of centerline Frontier Ave.

	Date	Time
DRILLING STARTED	9/18/80	0750
DRILLING COMPLETED	9/20/80	0929

DRILLER Joe Genovese

GEOLOGIST Phil Spooner

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573

TOPO POSITION flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 22-24, 28

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 41.2'

CASING DIAMETER 4"

CASING LENGTH 35'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none

DEPTH TO BEDROCK 35.1'

PUMP TEST DATA

STATIC DEPTH TO WATER 12.3'

DATE MEASURED 9/20/80 @ 0929

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

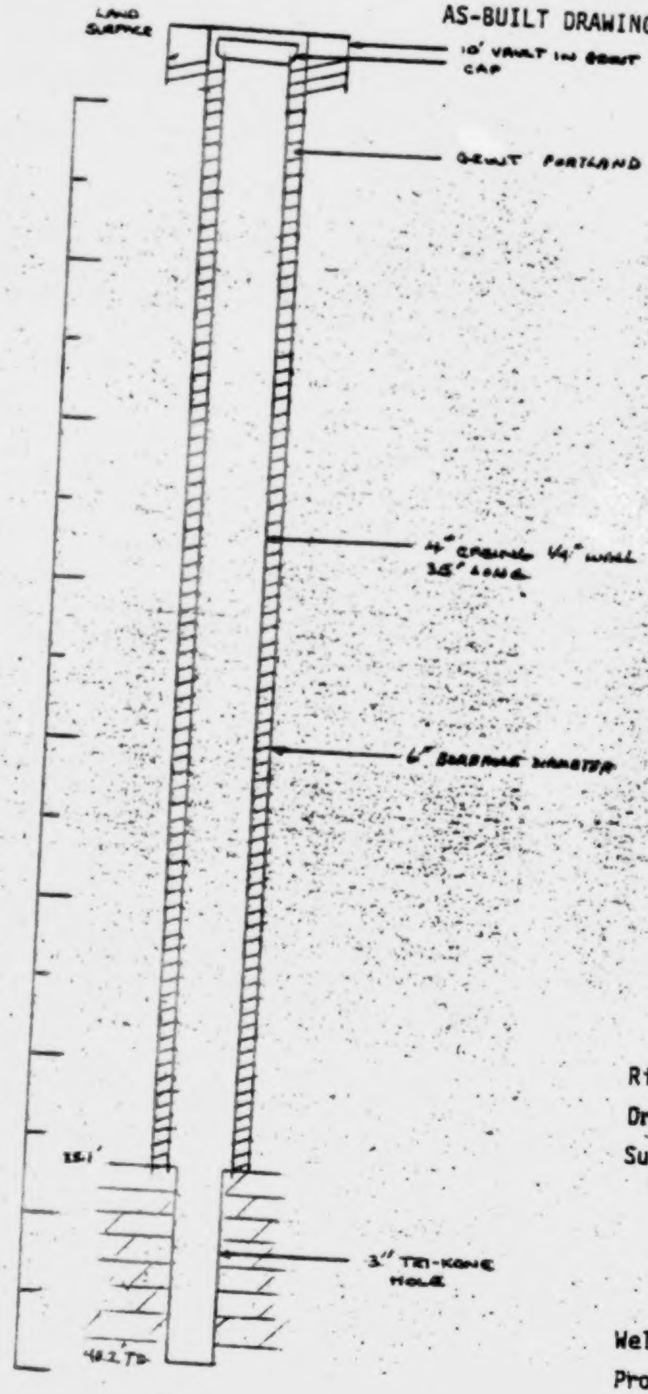
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45

Driller Joe Genovese

Supervisory Geologist Phil Spooner

Well No. 38-B

Project Love Canal

Location 280' west of centerline 96th St. & 160' north of centerline Frontier Ave.

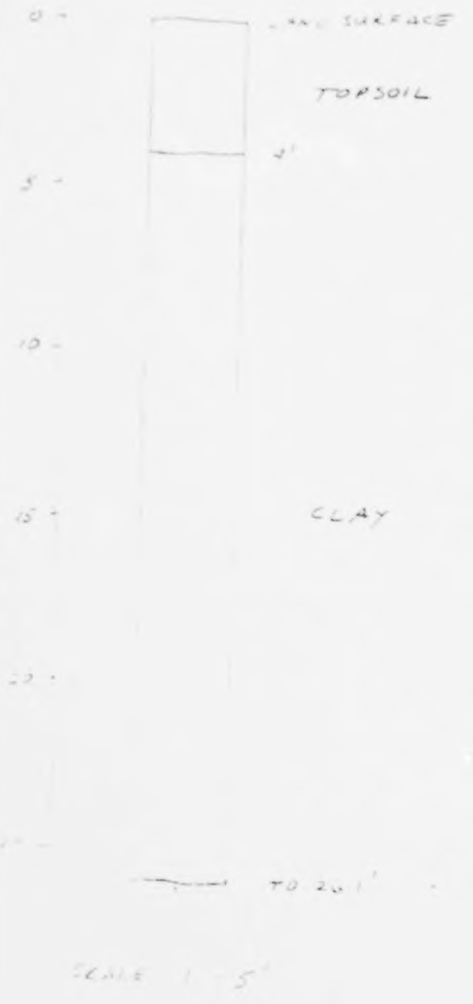
Date 9/20/80

Prepared By: Phil Spooner

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 39-A

LOCATION NE corner of 96th St. and Frontier Road

	Date	Time
DRILLING STARTED	9/17/80	1400
DRILLING COMPLETED	9/17/80	1525

DRILLER Mike Warner

GEOLOGIST Dave Conover

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 574.1

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 50

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 26.1'

CASING DIAMETER 2"ID

CASING LENGTH ~~22.2' 23'~~ 26'

SCREEN DIAMETER 2"

SCREEN SETTING 22'-24'

SCREEN SLOT/TYPE ~~None~~ stainless, .~~010"~~ slot .0001" X

PUMP TEST DATA

STATIC DEPTH TO WATER Dry

DATE MEASURED 9/17/80 1520

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

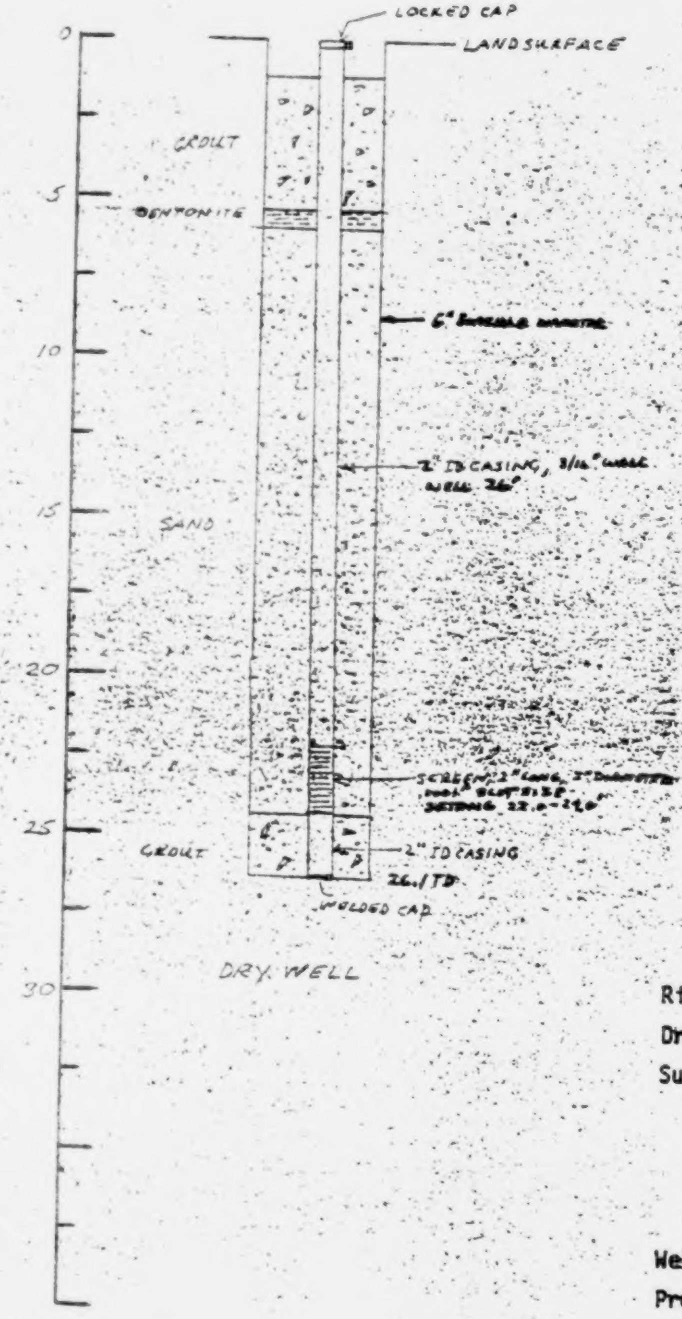
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Till at 29' depth
Screen interval set by Gamma-log interpretation

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S 0
Total Depth 26.1'
Borehole Diameter 6"
Casing Diameter 2"ID
Casing Thickness 3/16"
Casing Lengths 26'
Screen Data
  Material Stainless
  Diameter 2"
  Slot Openings .001"
  Seitings 22.0-24.0'
Centralizers none
Grout Type Portland Cement
Gravel Pack Quartzite #4
K-Fittings none
Packers none
Cement Baskets none

X

Rig Type CME-55
Driller Mike Warner
Supervisory Geologist Dave Conover

Well No. 39-A
Project Love Canal
Location NE corner 96th St. and Frontier Rd.

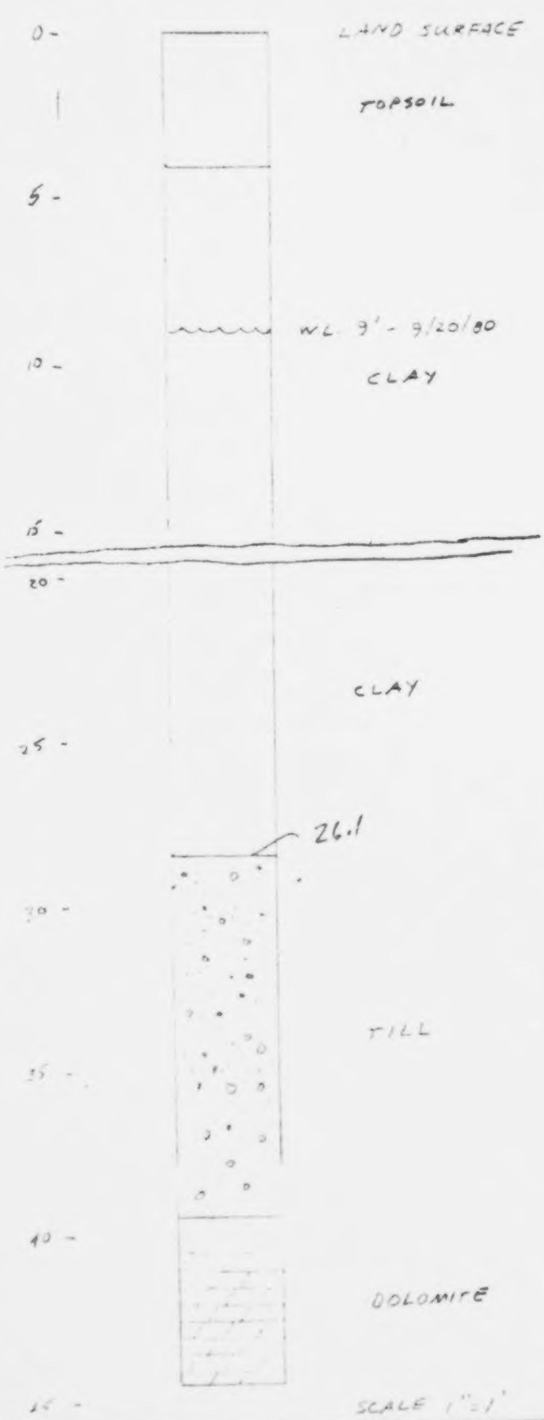
Prepared By: Dave Conover
Scale: 1"=5'

Date 9/17/80

WELL LOG

PROFILE

DESCRIPTION



PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 39-B

LOCATION NE corner of 96th St. and Frontier Rd.

	Date	Time
DRILLING STARTED	9/16/80	1405
DRILLING COMPLETED	9/20/80	1230

DRILLER Mike Warner

GEOLOGIST Dave Conover

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION unknown 574.1

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 47-50,56,57

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 44.5' BLS

CASING DIAMETER 4"

CASING LENGTH 38.5'

SCREEN DIAMETER none used

SCREEN SETTING " "

SCREEN SLOT/TYPE " "

DEPTH TO BEDROCK 40'

PUMP TEST DATA

STATIC DEPTH TO WATER 9' BLS

DATE MEASURED 9/20/80 @ 1238

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

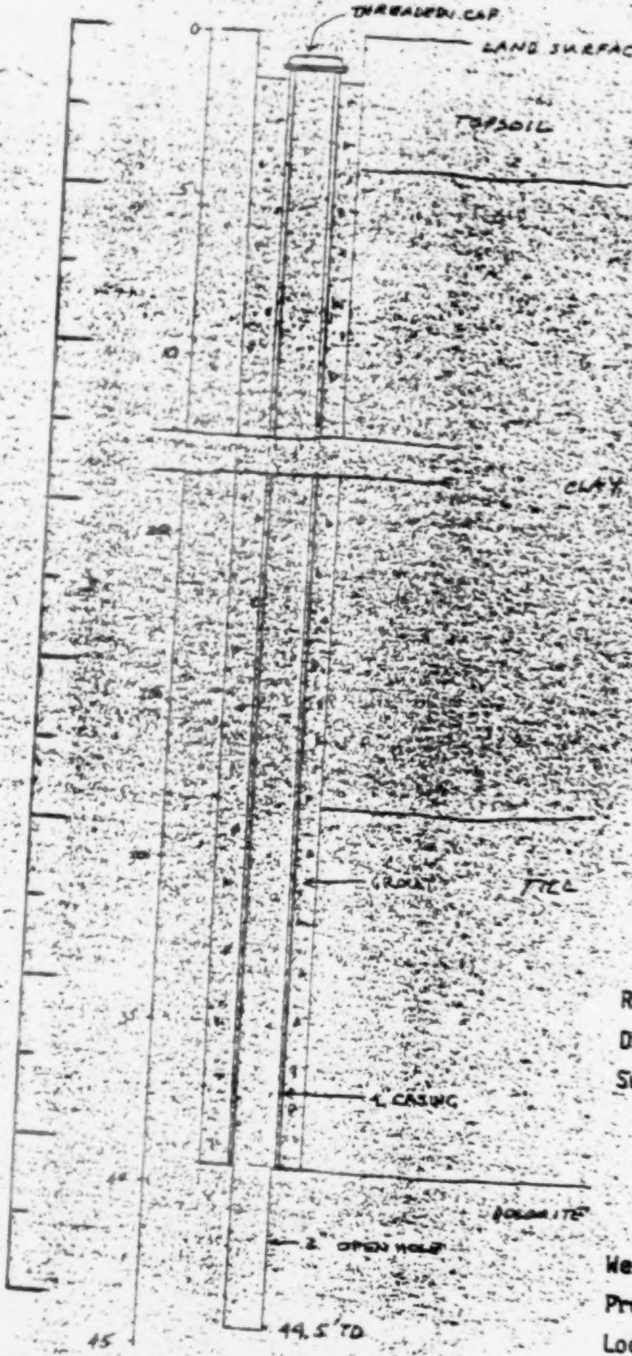
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation MINUS
Casing Height Above L-S -1.0'
Total Depth ~~43.5'~~ 44.5 BLS
Borehole Diameter 6"
Casing Diameter 4"
Casing Thickness 5/16"
Casing Lengths 38.5'
Screen Data none used
- Material
- Diameter
- Slot Openings
- Seitings

Centralizers none
Grout Type Portland Cement Type I
Gravel Pack none
K-Fittings none
Packers none
Cement Baskets none

Rig Type CME-55
Driller Mike Warner
Supervisory Geologist Dave Conover

Well No. 39-B
Project Love Canal
Location NE corner of 96th St. and Frontier Rd.

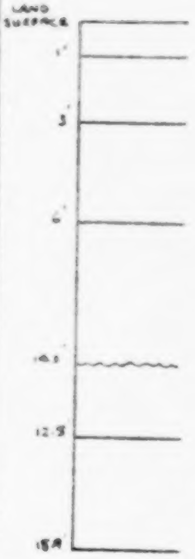
Date 9/20/80

Prepared By: Dave Conover
Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN LOAM TO SILT LOAM, MOIST, LOOSE, FILL

DARK BROWN SILTY CLAY LOAM, MOIST

BROWN TO RED BROWN SILT LOAM, MOIST, SOMEWHAT FIRM

GRAY BROWN SILTY CLAY, VERY MOIST, PLASTIC

GRAY BROWN CLAY TO SILTY CLAY, WET, PLASTIC, STICKY

SCALE: 1" = 5'

PROJECT Love Canal
OWNER Diane Osethkowski
WELL NO. 40-A
LOCATION 1116 93rd St. - front yard

	Date	Time
DRILLING STARTED	9/22/80	1524
DRILLING COMPLETED	9/23/80	0903

DRILLER Ron Bush
GEOLOGIST Mitch Brodsky
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed 573.2
TOPO POSITION flat lying
PROFILE BY Mitch Brodsky
FIELD BOOK NO. 5 PAGES 34-40

WELL DATA

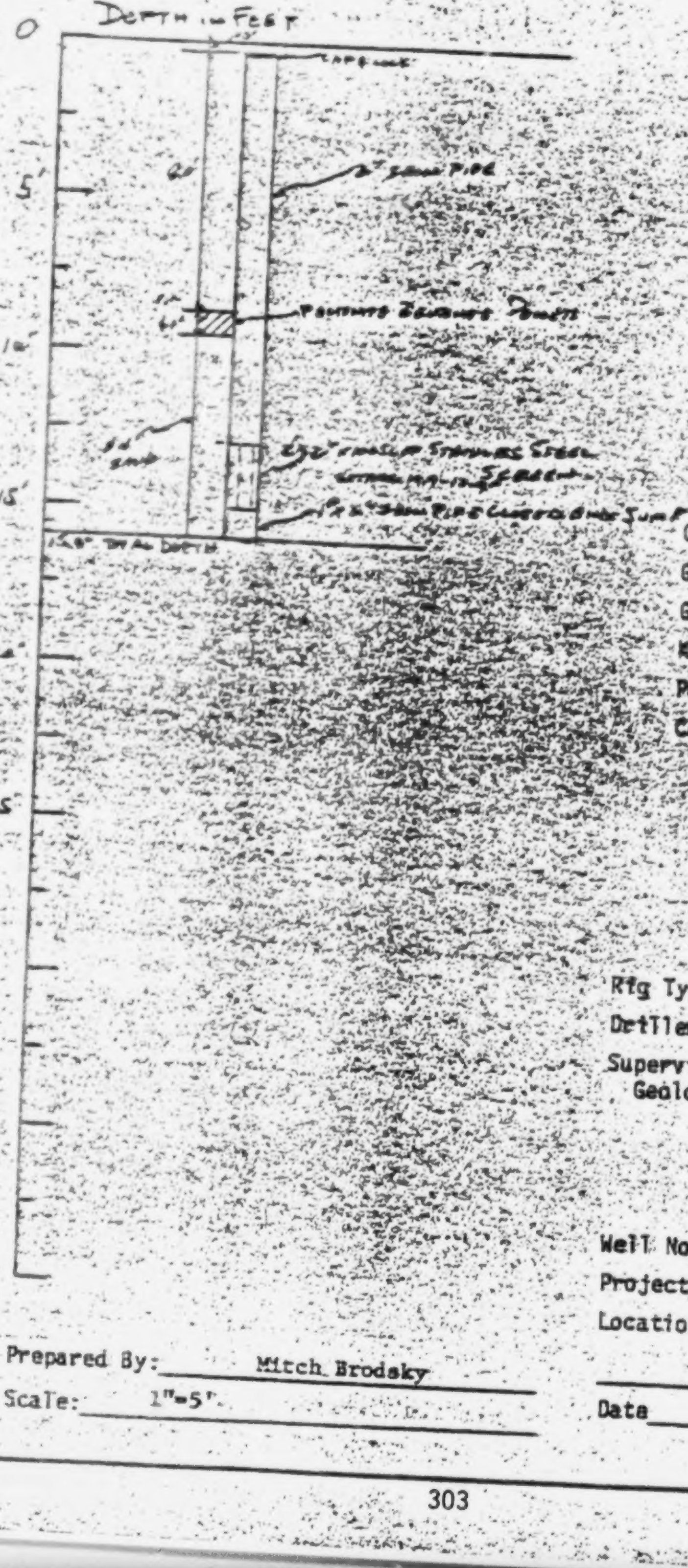
HOLE DIAMETER 6"
HOLE DEPTH 15.9'
CASING DIAMETER 2"
CASING LENGTH 15.6'
SCREEN DIAMETER 2"
SCREEN SETTING 12.9'-14.9'
SCREEN SLOT/TYPE .0001" slot/stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER 10.3'
DATE MEASURED 9/22/80 @ 1538
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S -.3"
Total Depth 15.9'
Borehole Diameter 6"
Casing Diameter 2"
Casing Thickness 3/16"
Casing Lengths 15.6'
Screen Data
Material stainless steel
Diameter 2"
Slot Openings .001 [illegible] slot
Settings 14.9'-12.9'
Centralizers
Grout Type Huron Type II Portland Cement
Gravel Pack #SILICA SAND
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Mitch Brodsky

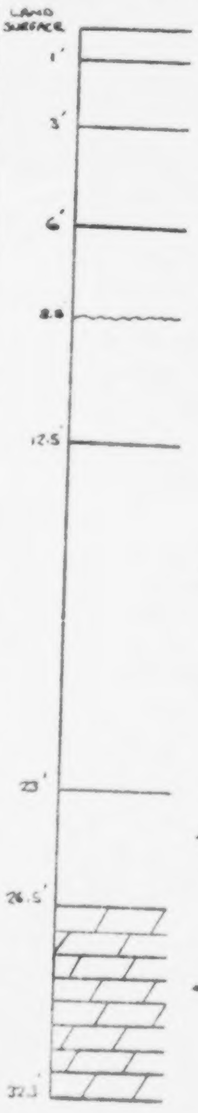
Well No. 40-A
Project Love Canal
Location Front yard of 1116 93rd St.

Prepared By: Mitch Brodsky
Scale: 1"=5'

Date 9/23/80

WELL LOG

PROFILE



DESCRIPTION

DARK BROWN LOAM TO SILT LOAM, MOIST, LOOSE, FILL

DARK BROWN SILTY CLAY LOAM, MOIST

BROWN TO RED BROWN SILT LOAM, MOIST, SOME-WHAT FIRM

GRAY BROWN SILTY CLAY, VERY MOIST, PLASTIC

GRAY BROWN CLAY TO SILTY CLAY, WET, PLASTIC, STICKY

BROWN TO GRAY BROWN SILTY CLAY, MOIST, PLASTIC, MUCH GRAVEL, COBBLES (TILL)

LOCKPORT DOLOMITE

SCALE: 1" = 5'

PROJECT	Love Canal	
OWNER	Diane Osethkowski	
WELL NO.	40-B	
LOCATION	1116 93rd St. - front yard	

	Date	Time
DRILLING STARTED	9/20/80	0700
DRILLING COMPLETED	9/23/80	1225
DRILLER	Ron Bush	
GEOLOGIST	Mitch Brodsky	
RIG TYPE	CME-55	
REFERENCE POINT	land surface	
R.P. ELEVATION	not yet surveyed 573.2	
TOPO POSITION	flat lying	
PROFILE BY	Mitch Brodsky	
FIELD BOOK NO.	5	PAGES 34-40

WELL DATA

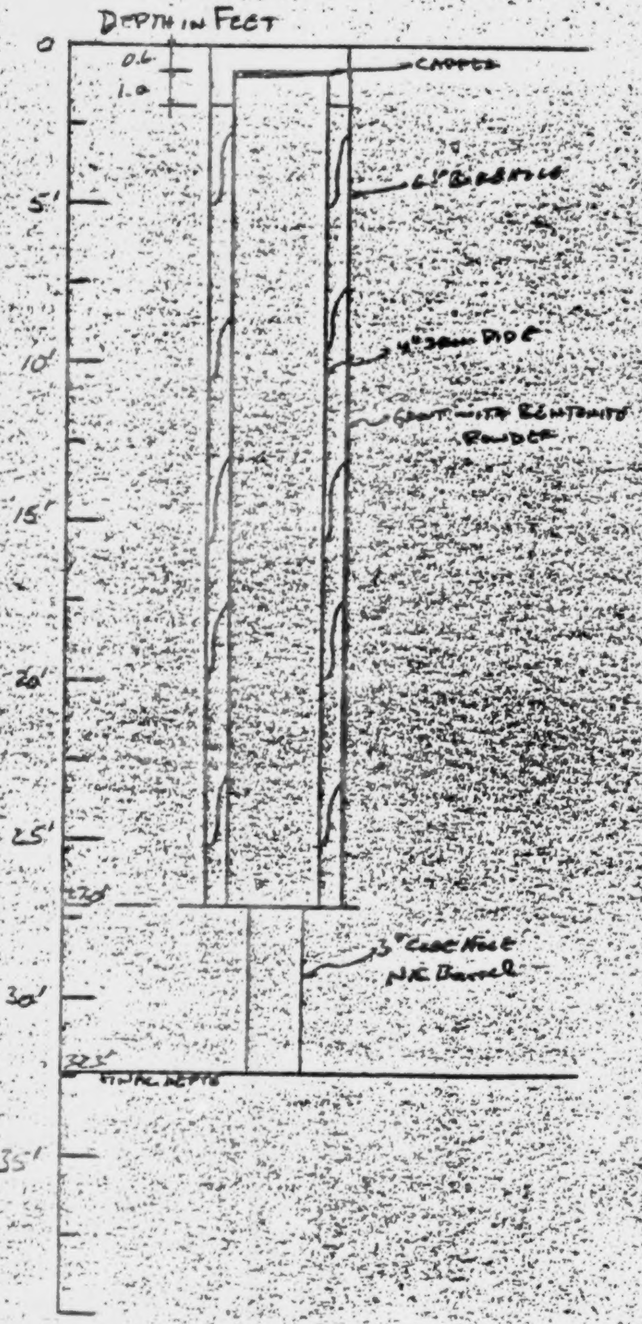
HOLE DIAMETER	6"
HOLE DEPTH	32.3'
CASING DIAMETER	4"
CASING LENGTH	26.5'
SCREEN DIAMETER	N/A
SCREEN SETTING	N/A
SCREEN SLOT/TYPE	N/A
DEPTH TO BEDROCK	27.0'

PUMP TEST DATA

STATIC DEPTH TO WATER	8.8'
DATE MEASURED	9/22/80 @ 0835
PUMPING DEPTH TO WATER	
TEST DURATION	
PUMPING RATE	
TEST DATE	
TEST TYPE	
PUMP SETTING	
SPECIFIC CAPACITY	

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S - 6"
Total Depth 32.3'
Borehole Diameter 6"
Casing Diameter 4"
Casing Thickness 5/16"
Casing Lengths 26.5'
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type Huron Type II Portland Cement
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Mitch Brodsky

Well No. 40-B
Project Love Canal
Location Front yard-1116 93rd St.

Prepared By: Mitch Brodsky
Scale: 1"=5'

Date 9/23/80

WELL LOG

PROFILE	DESCRIPTION
0	CINDERS BLACK SANDY SILTY LOAM
2.5'	YELLOWISH GRAY BROWN SILTY CLAY
4'	GRAY BROWN SILTY CLAY
5'	YELLOWISH GRAY BROWN SILTY CLAY
7'	REDDISH BROWN SILTY CLAY
9'	
11'	
13'	REDDISH GRAY CLAY
15'	
22.5'	

PROJECT Love Canal

OWNER Nancy Ross

WELL NO. 41-A

LOCATION 1110 91st St.

	Date	Time
DRILLING STARTED	9/23/80	1215
DRILLING COMPLETED	9/23/80	1500

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 572.7

TOPO POSITION flat lying

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 71-73

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 22.5'

CASING DIAMETER 2"

CASING LENGTH 22'

SCREEN DIAMETER 2"

SCREEN SETTING 20.5'-18.5'

SCREEN SLOT/TYPE ~~.001"~~ Johnson Stainless steel .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/23/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

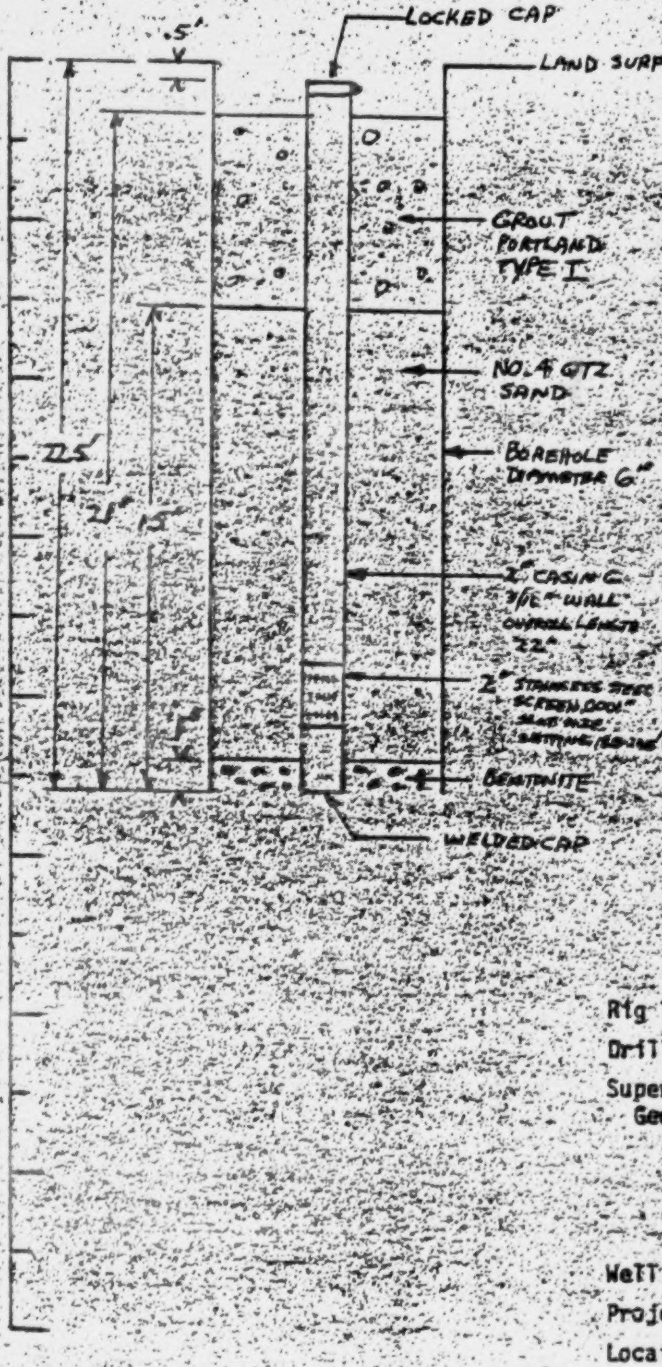
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist Dennis Stanczuk

Well No. 47-A
Project Love Canal
Location 1110 91st St.

Prepared By: Dennis Stanczuk
Scale: 1"=5'

Date 9/23/80

WELL LOG

PROFILE	DESCRIPTION
0	
	BLACK ASH, CINDERS GRAVEL SANDY LOAM
25'	
	YELLOW BROWN SILTY CLAY
4'	
	REDDISH GRAY BROWN SILTY CLAY
5.5'	
	YELLOWISH GRAY BROWN SILTY CLAY
6.5'	
	REDDISH BROWN SILTY CLAY MOIST
9'	
	REDDISH GRAY BROWN SILTY CLAY SOFT TO VERY SOFT
23.5'	
	SOFT REDDISH BROWN TILL
24.5'	
	HARD TILL
26.3	
	DOLOMITE
32.4'	

PROJECT Love Canal

OWNER Nancy Ross

WELL NO. 41-B

LOCATION 1110 91st St.

	Date	Time
DRILLING STARTED	9/22/80	1100
DRILLING COMPLETED	9/27/80	1600

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 572.7

TOPO POSITION flat

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 65-70, 86

WELL DATA

HOLE DIAMETER 6"/ 2 15/16"

HOLE DEPTH 26.3'/ 32.4'

CASING DIAMETER 4"

CASING LENGTH 26.5'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 26.3'

PUMP TEST DATA

STATIC DEPTH TO WATER 6.9'

DATE MEASURED 9/23/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

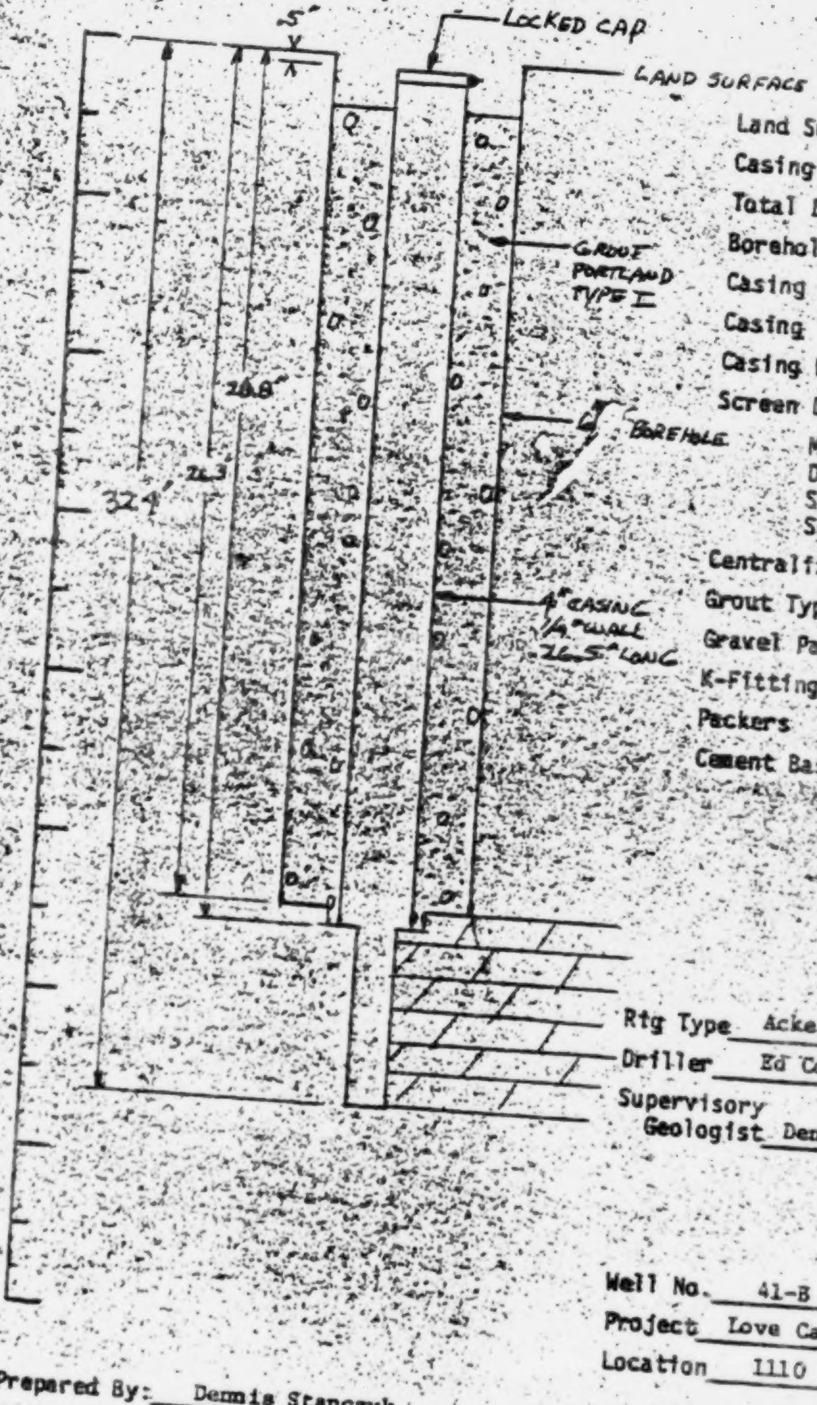
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Saltings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist Dennis Stanczuk

Well No. 41-B
Project Love Canal
Location 1110 91st St.

Prepared By: Dennis Stanczuk
Scale: Vertical 1"=5'

Date 9/27/80

WELL LOG

PROFILE	DESCRIPTION
LAND SURFACE	
	VEGETATION; DARK BROWN, MOIST LOAM.
2'	
	RED/BROWN MOIST LOAM.
5'	
	RED/BROWN WET CLAYEY LOAM
7'	
	RED MOIST SILTY CLAY
14'	
	PEBBLE LAYER WITHIN RED SILTY CLAY.
16'	
	RED VERY WET SILTY CLAY.
20'	

SCALE 1" = 5'

PROJECT Love Canal

OWNER Anthony Nudo

WELL NO. 42-A

LOCATION Vacant lot opposite 1261 95th St.

	Date	Time
DRILLING STARTED	9/16/80	1148
DRILLING COMPLETED	9/16/80	1345

DRILLER Joe Jensen

GEOLOGIST Ed Tokarski

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION ~~not surveyed~~ 573.1

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES 4-5

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 20'

CASING DIAMETER 2"

CASING LENGTH 20'

SCREEN DIAMETER 2"

SCREEN SETTING 19' to 17' BLS.

SCREEN SLOT/TYPE .001 Stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/16/80 1315

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

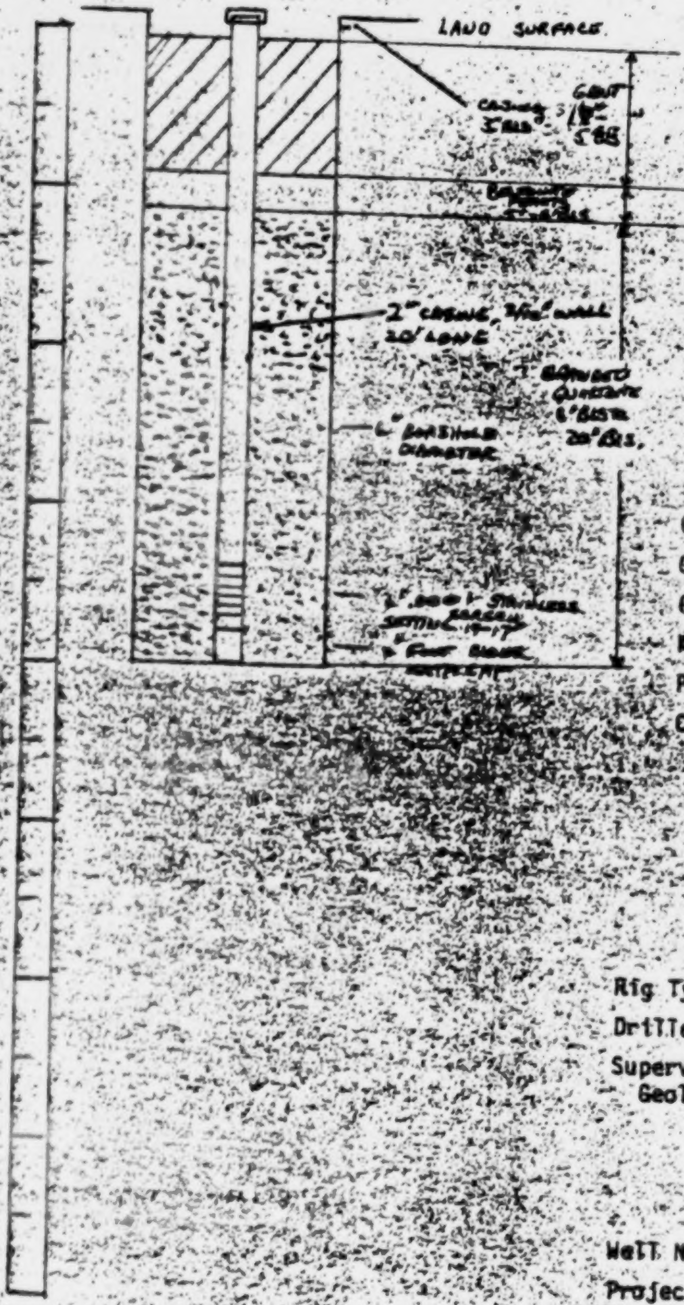
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Ed Tokarski

Well No. 42-A

Project Love Canal

Location Vacant lot opposite
1261 95th St.

Date 9/16/80

Prepared By: EC Ed Tokarski

Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
	VEGETATION - DARK BROWN MOIST LOAM
2'	
	RED/BROWN MOIST LOAM
5'	
	RED/BROWN SILTY LOAM
7'	
	RED MOIST SILTY CLAY
14'	
	PEBBLES IN SILTY CLAY
16'	
	VERY WET RED SILTY CLAY
20'	
	TILL - RED MATRIX
22.8'	
	DOLOMITE

PROJECT Love Canal
OWNER Anthony Nudo
WELL NO. 42-B/C
LOCATION vacant lot opposite 1261 95th St.

	Date	Time
DRILLING STARTED	9/11/80	0950
DRILLING COMPLETED	9/16/80	1140

DRILLER Joe Jensen
GEOLOGIST C. Kufs, P. Spooner, E. Tokarski
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION not surveyed 573.1
TOPO POSITION flat lying
PROFILE BY Ed Tokarski
FIELD BOOK NO. 10 PAGES 1-5

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH B: 34' C: 192'
CASING DIAMETER 4"
CASING LENGTH 24.8'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
DEPTH TO BEDROCK 22.8'

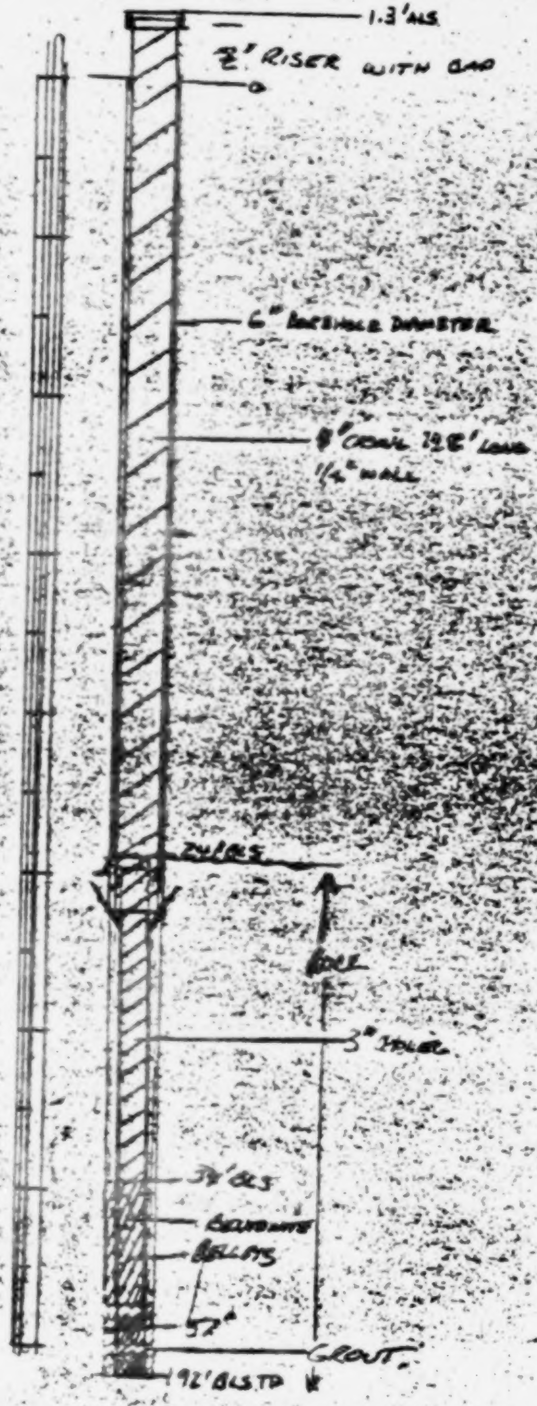
PUMP TEST DATA

STATIC DEPTH TO WATER 8.4' BLS
DATE MEASURED 9/16/80 @ 1140
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

See Core Log for 42-C
C was grouted up to 34' BLS to make 42-B

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

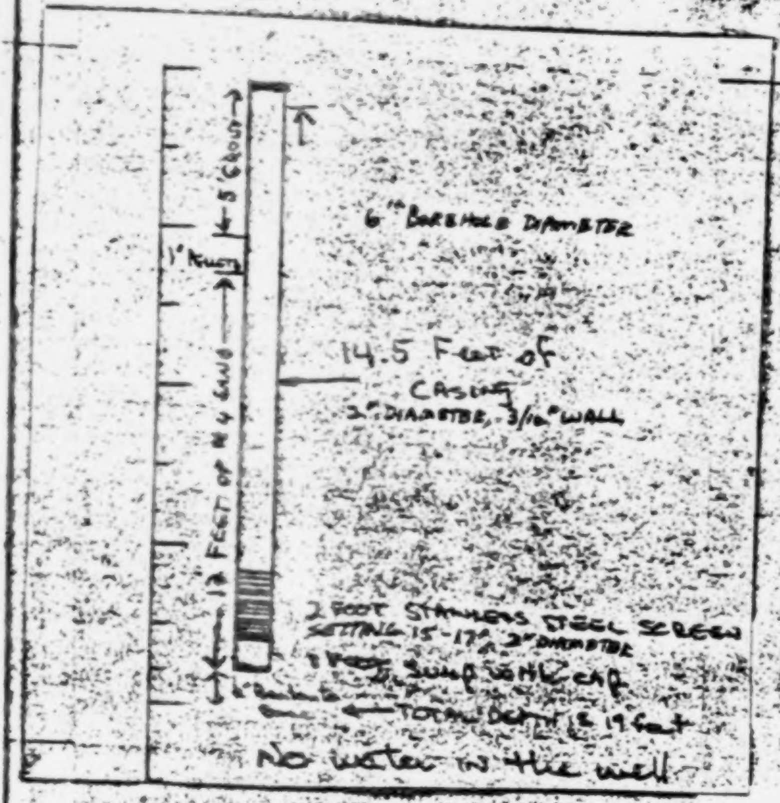
Rig Type CME-55
Driller Joe Jensen
Supervisory Geologist Ed Tokarski

Well No. 42-Ⓑ/C
Project Love Canal
Location vacant lot opposite 1261 95th St.

Prepared By: Ed Tokarski
Scale: 1"=5'

Date 9/19/80

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Charlie Kufs

Well No. 43-A

Project Love Canal

Location Field in rear of barn at Millville Dairy - 9802 Cayuga Dr.

Date 9/11/80

Prepared By: C. Kufs .

Scale: 1"=5'

43B

WELL LOG

	PROFILE	DESCRIPTION
	TOPSOIL	DARK BROWN SILT LOAM
0.5'	CLAYEY SILT	Medium to DARK BROWN, clayey silt with STRINGERS OF ORANGE and black silt
3.5'	Silty clay	DARK BROWN TO REDDISH BROWN SILTY CLAY WITH SOME SMALL (less than 1 cm) pebbles
7'	CLAY	Medium brown clay to Silty clay with a few STRINGERS of ORANGE silt. Unit is dry at the top but MOIST at the bottom
17'	Till	Medium to dark Reddish brown Till with pebbles up to 2 cm
23.7'	Dolomite	Medium to dark grey dolomite

29.7 Feet to hole bottom from land surface

PROJECT Love Canal

OWNER Herbert Millville

WELL NO. 43-B

LOCATION Field in rear of barn at Millville Dairy --9802 Cayuga Dr.

	Date	Time
DRILLING STARTED	9/10/80	0755
DRILLING COMPLETED	9/10/80	1745

DRILLER Joe Jensen

GEOLOGIST Charles Kufs

RIG TYPE CME 55

REFERENCE POINT LAND SURFACE

R.P. ELEVATION 574.1

TOPO POSITION FLAT

PROFILE BY C. Kufs

FIELD BOOK NO. 3 PAGES 32-35

WELL DATA

HOLE DIAMETER 6" to bedrock; 2 15/16 in rock

HOLE DEPTH 29.7'

CASING DIAMETER 2"

CASING LENGTH 24.3'

SCREEN DIAMETER NA

SCREEN SETTING NA

SCREEN SLOT/TYPE NA

DEPTH TO BEDROCK 23.7'

PUMP TEST DATA

STATIC DEPTH TO WATER 9.3' below top of casing

DATE MEASURED 9/10/80 @ 1743

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Top of bedrock = 23.7' BLS

Top of till = 17.0' BLS

Depth of hole = 29.7' BLS

43A

WELL LOG

	PROFILE	DESCRIPTION
	LAND SURFACE	
0.5'	TOPSOIL	DARK BROWN SILT LOAM
2.5'	CLAYEY Silt	STIFF, MOIST, Medium TO DARK BROWN, Clayey silt with stringers of orange AND Black silt
9'	Silty Clay	DRY, dark brown to Reddish BROWN Silty clay with some small (less than 10 mm) pebbles
17'	CLAY	Medium brown clay to silty clay with a few stringers of orange silt. Unit is Dry at top but moist at the bottom
	Till	Medium to dark ~~reddish~~ brown till with pebbles up to 2 mm

19 Feet to Bottom of hole from Surface

PROJECT Love Canal

OWNER Herbert Millville

WELL NO. 43-A

LOCATION Field in rear of barn at Millville Dairy--9802 Cayuga Dr.

	Date	Time
DRILLING STARTED	9/11/80	1500
DRILLING COMPLETED	9/11/80	1630

DRILLER Joe Jensen

GEOLOGIST Charles Kufs

RIG TYPE CME - 55

REFERENCE POINT LAND SURFACE

R.P. ELEVATION 574.1

TOPO POSITION FLAT

PROFILE BY C. Kufs

FIELD BOOK NO. 3 PAGES 38

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 17'

CASING DIAMETER 2"

CASING LENGTH 15'

SCREEN DIAMETER 2"

SCREEN SETTING 15' to 17'

SCREEN SLOT/TYPE Johnson 10 slot/stainless steel .0001"

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/11/80 @ 1613

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

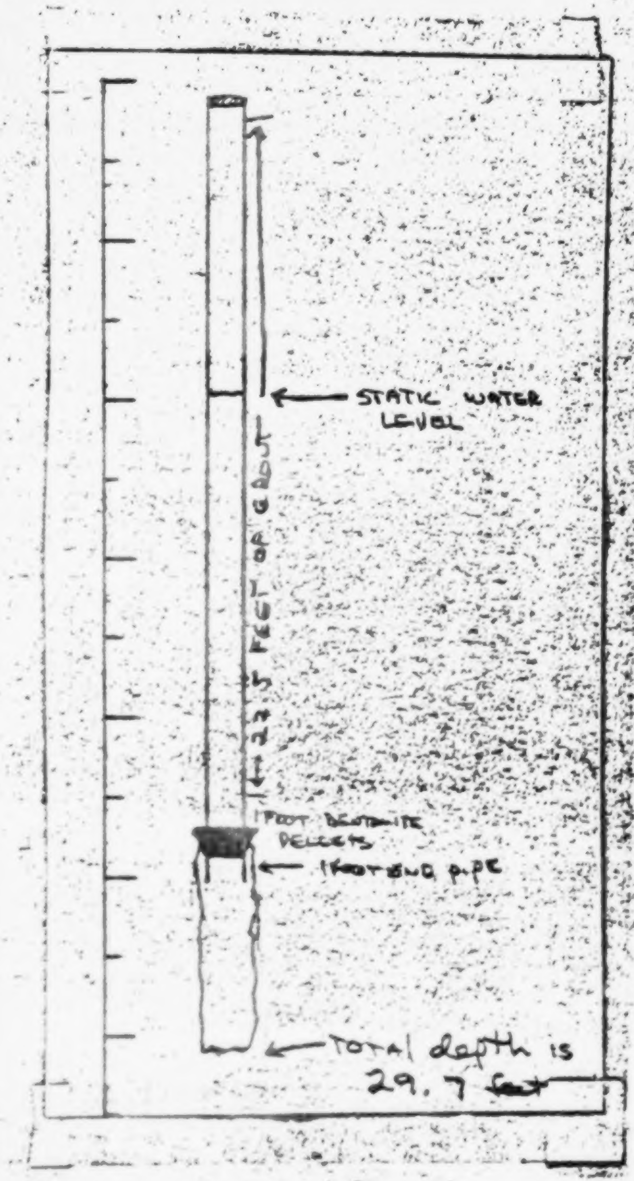
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Charlie Kufs

Well No. 43-B

Project Love Canal

Location Field in rear of barn at Millville Dairy - 9802 Cayuga Dr.

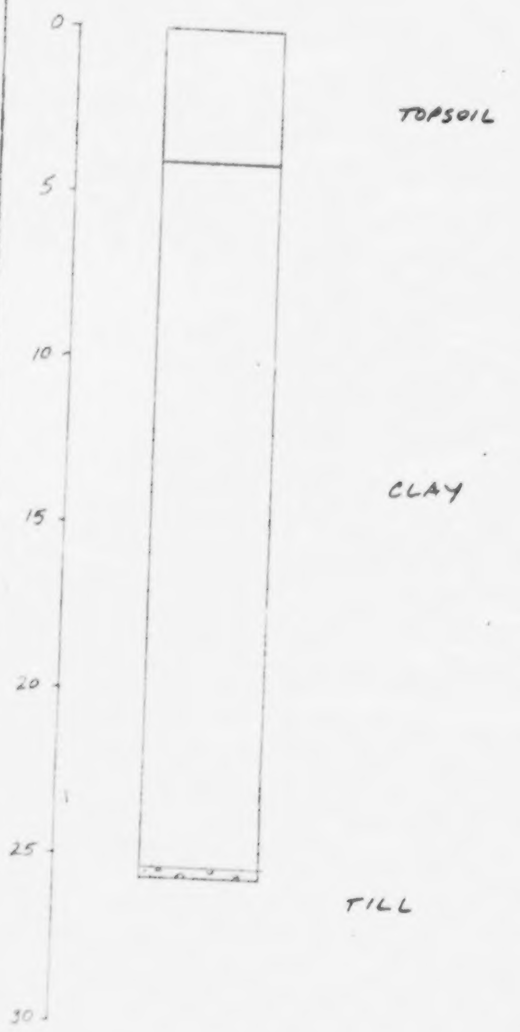
Prepared By: C. Kufs

Scale: 1"=5'

Date 9/10/80

WELL LOG

PROFILE DESCRIPTION



SCALE: 1"=5'

PROJECT Love Canal
OWNER Ruby Maulis
WELL NO. 44-A
LOCATION Immediately west of 9818 Buffalo Ave.

	Date	Time
DRILLING STARTED	9/19/80	0945
DRILLING COMPLETED	9/19/80	1100

DRILLER Mike Warner
GEOLOGIST Dave Conover
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION unknown 574.6
TOPO POSITION flat lying, local depression
PROFILE BY Dave Conover
FIELD BOOK NO. 8 PAGES 53-54

WELL DATA

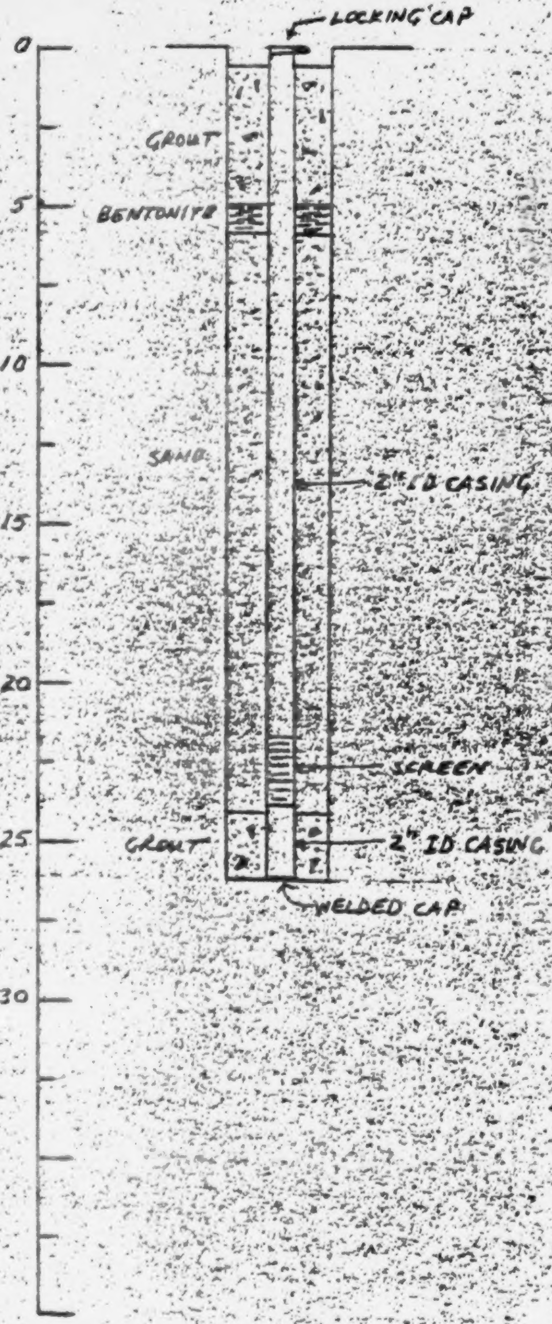
HOLE DIAMETER 6"
HOLE DEPTH 26'
CASING DIAMETER 2"ID
CASING LENGTH 22', 2'
SCREEN DIAMETER 2"
SCREEN SETTING 22'-24'
SCREEN SLOT/TYPE Horz. slot, stainless
.0001" ~~.010"~~ slots

PUMP TEST DATA

STATIC DEPTH TO WATER Dry
DATE MEASURED 9/19/80
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S 2" BLS
Total Depth 26'-2"
Borehole Diameter 6"
Casing Diameter 2"ID
Casing Thickness 3/16"
Casing Lengths 22',2'
Screen Data
    Material . Stainless
    Diameter - 2"
    Slot Openings ~~.010"~~, .0001"
    Seitings 22-24'
Centralizers none
Grout Type Portland Cement
Gravel Pack Quarzite Sand #4
K-Fittings none
Packers none
Cement Baskets none

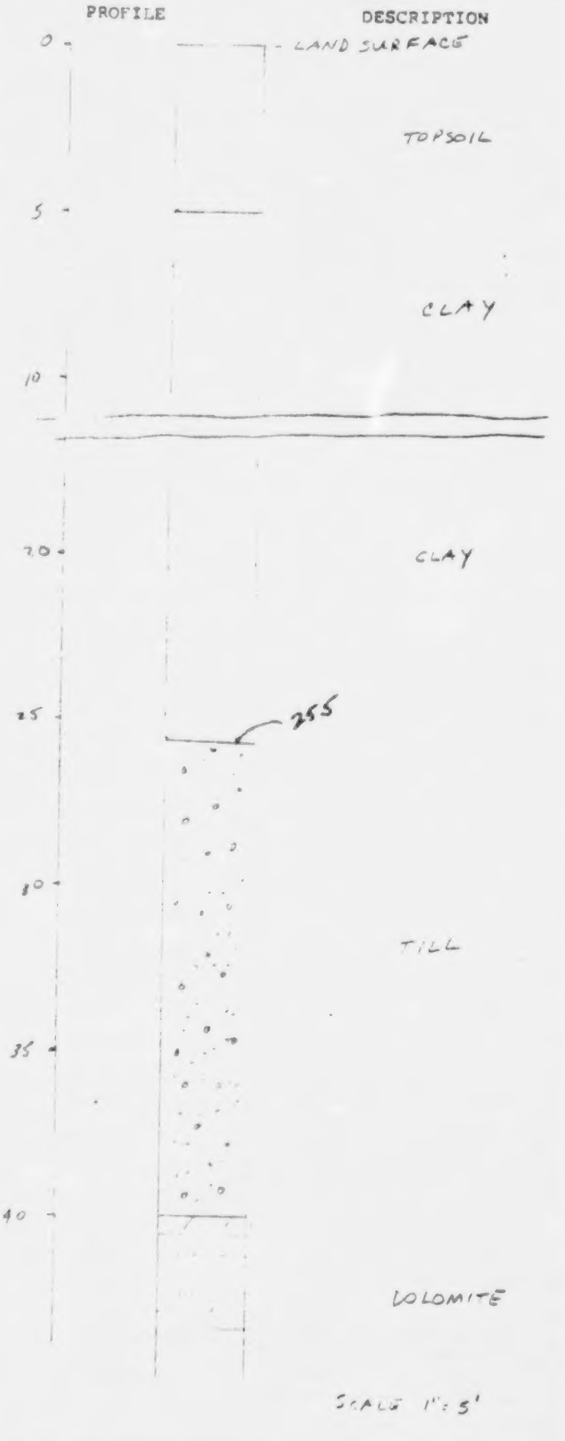
Rig Type CME-55
Driller Mike Warner
Supervisory Geologist Dave Conover

Well No. 44-A
Project Love Canal
Location Immediately west of 9818 Buffalo Ave.

Date 9/19/80

Prepared By: Dave Conover
Scale: 1"=5'

WELL LOG



PROJECT Love Canal

OWNER Ruby Maulis

WELL NO. 44-E

LOCATION Lot immediately west of 9818
Buffalo Ave.

	Date	Time
DRILLING STARTED	9/18/80	0755
DRILLING COMPLETED	9/23/80	1345

DRILLER Mike Warner

GEOLOGIST Dave Conover

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION unknown 574.6

TOPO POSITION flat lying & local depression

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 51-54

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 45.92'

CASING DIAMETER 4"

CASING LENGTH 40.5'

SCREEN DIAMETER none used

SCREEN SETTING none used

SCREEN SLOT/TYPE none used

DEPTH TO BEDROCK 40'

PUMP TEST DATA

STATIC DEPTH TO WATER not measured

DATE MEASURED

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

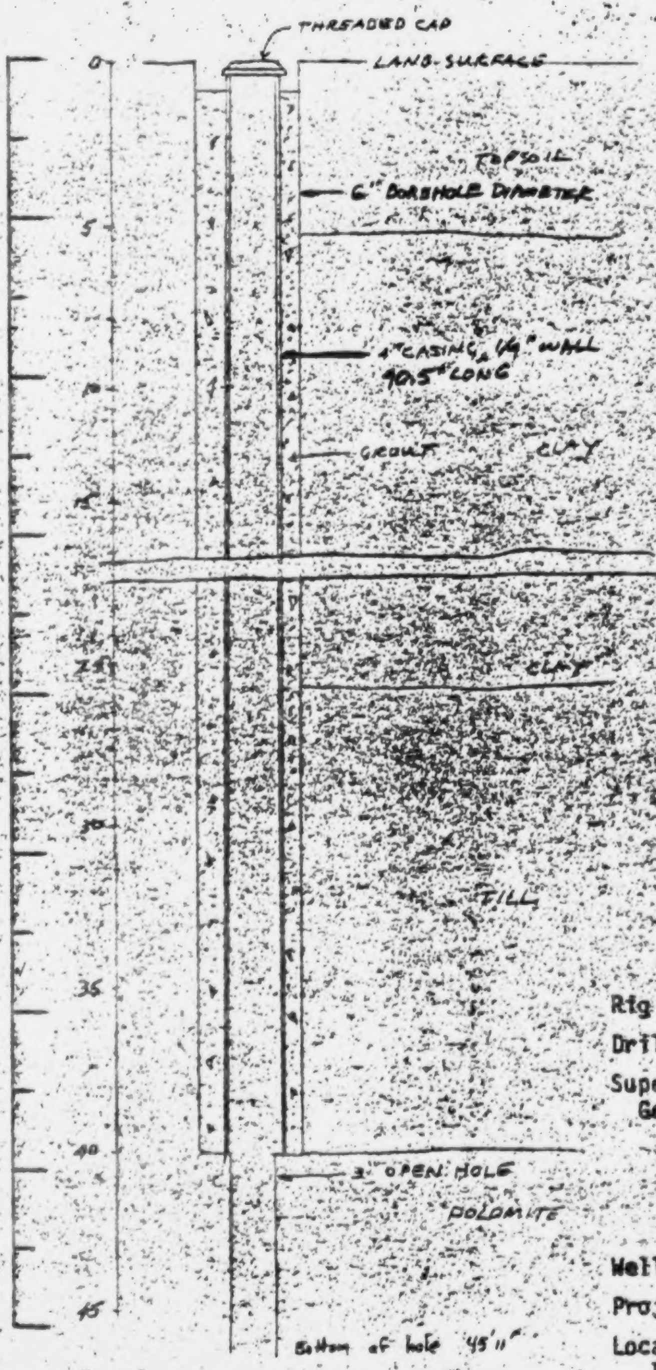
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dave Conover

Well No. 44-B

Project Love Canal

Location Immediately west of 9818 Buffalo Ave.

Date 9/23/80

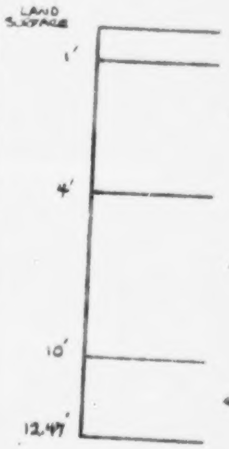
Prepared By: Dave Conover & Tom Farmer

Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN SILT LOAM, MOIST, SLIGHTLY FIRM

BROWN AND YELLOWISH BROWN, SANDY CLAY, MOIST, FIRM

BROWN TO RED BROWN CLAY TO SILTY CLAY, MOIST, PLASTIC

RED BROWN SILTY CLAY TO CLAY, VERY MOIST, VERY PLASTIC, STICKY

SCALE: 1" = 5'

PROJECT Love Canal
OWNER Marion Smith
WELL NO. 45-A
LOCATION 9505 Cayuga Dr. - rear of lot

	Date	Time
DRILLING STARTED	9/19/80	1445
DRILLING COMPLETED	9/19/80	1815

DRILLER Ron Bush
GEOLOGIST Mitch Brodsky
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed 571.5
TOPO POSITION flood plain
PROFILE BY Mitch Brodsky
FIELD BOOK NO. 5 PAGES 31-33

WELL DATA

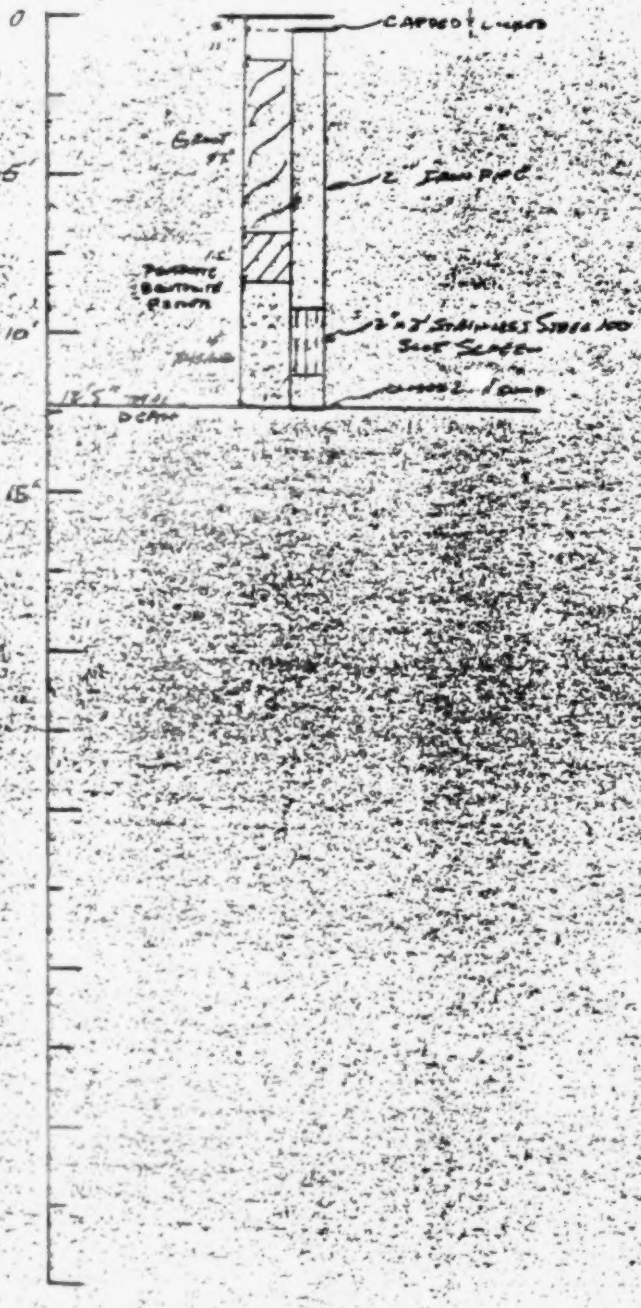
HOLE DIAMETER 6"
HOLE DEPTH 12.42'
CASING DIAMETER 2"
CASING LENGTH 12'
SCREEN DIAMETER 2"
SCREEN SETTING 9.42'-11.42'
SCREEN SLOT/TYPE .0001" slot/stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 9/19/80 @ 1810
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation

Casing Height Above L-S MINUS 5" X

Total Depth 12'5"

Borehole Diameter 6"

Casing Diameter 2"

Casing Thickness ~~5/16"~~ 3/16

Casing Lengths 12'

Screen Data

- Material stainless steel
- Diameter 2"
- Slot Openings ~~100~~ .0001" slot
- Settings 11'5"-9'5"

Centralizers

Grout Type Huron Type II Portland Cement

Gravel Pack

K-Fittings

Packers

Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Mitch Brodsky

Well No. 45-A

Project Love Canal

Location South of 9505 Cayuga Dr.

Prepared By: Mitch Brodsky

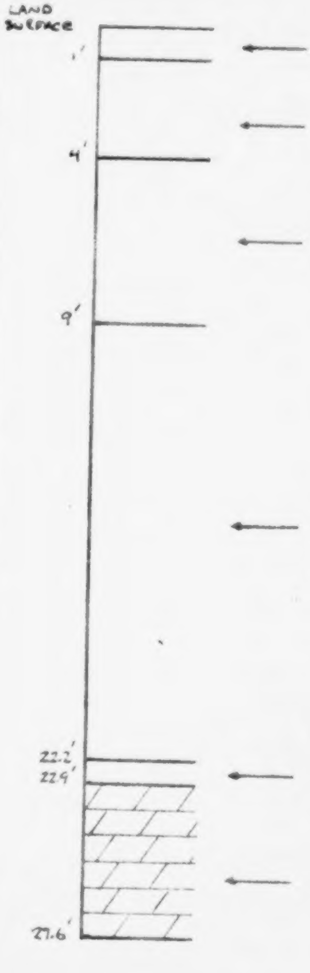
Scale: 1"=5'

Date 9/19/80

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN SILT LOAM MOIST, FRIABLE

BROWN AND YELLOW BROWN SILTY CLAY LOAM, MOIST FIRM, SLIGHTLY PLASTIC

BROWN TO RED BROWN. SILTY CLAY, MOIST, PLASTIC, SLIGHTLY STICKY

BROWN TO RED BROWN CLAY, VERY MOIST TO WET, PLASTIC, STICKY MOTTLED

RED BROWN SILTY CLAY WET, PLASTIC, STICKY GRAVELLY, COBBLY

LOCKPORT DOLOMITE

SCALE: 1" = 5'

PROJECT Love Canal

OWNER Marion Smith

WELL NO. 45-B

LOCATION 9505 Cayuga Dr. - rear of lot

	Date	Time
DRILLING STARTED	9/19/80	0850
DRILLING COMPLETED	9/19/80	1815

DRILLER Ron Bush

GEOLOGIST Mitch Brodsky

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 571.5

TOPO POSITION flood plain

PROFILE BY Mitch Brodsky

FIELD BOOK NO. 5 PAGES 31-33

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 27.6'

CASING DIAMETER 4"

CASING LENGTH 22.2'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 22.9'

PUMP TEST DATA

STATIC DEPTH TO WATER 7.25'

DATE MEASURED 9/19/80 @ 1207

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

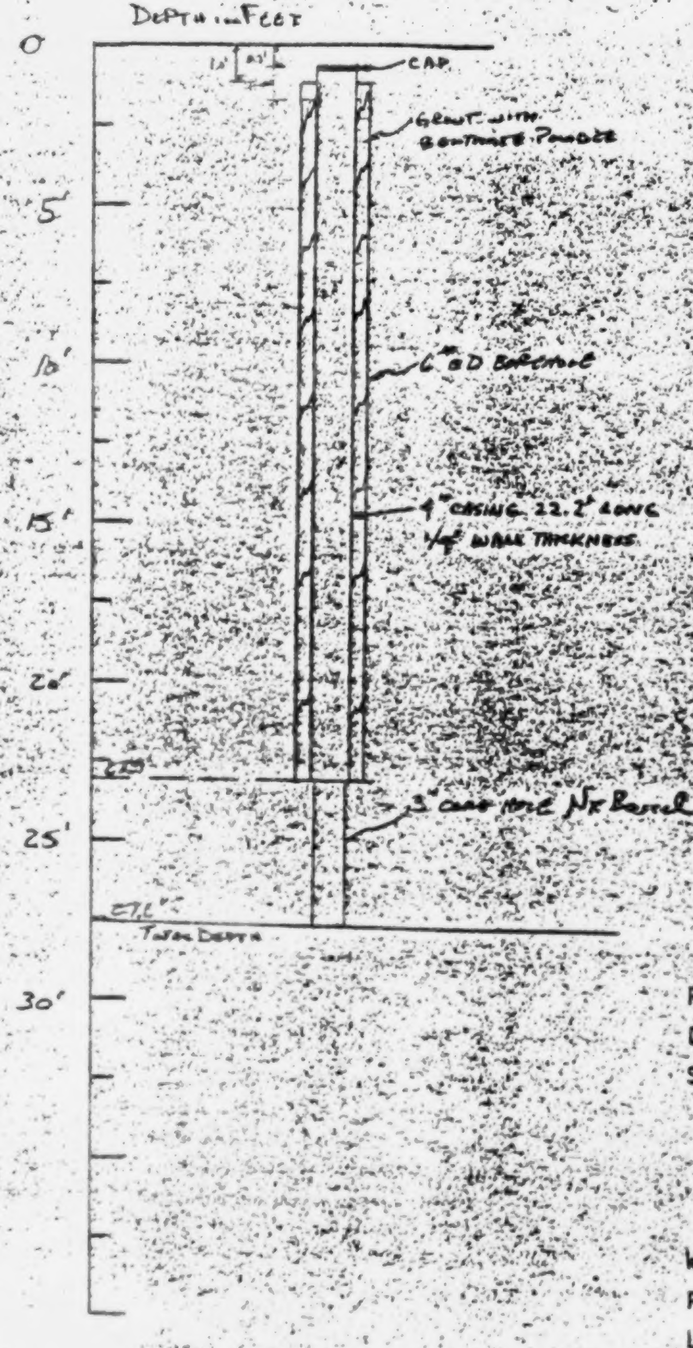
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
- Material
- Diameter
- Slot Openings
- Seitings

Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Mitch Brodsky

Well No. 45-B
Project Love Canal
Location South of 9505 Cayuga Dr.

Prepared By: Mitch Brodsky
Scale: 1"=5'

Date 9/23/80

WELL LOG

PROFILE	DESCRIPTION
0	
3'	brown to grey brown powdery fill
7'	sandy selt - yellow to yellow brown
	clay, brown and moist
17'	clay - brown to grey brown, wet
23'	till - pebbles and stones in brown silty clay
24.5'	

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 46-A

LOCATION SE corner of Read and 91st St.

	Date	Time
DRILLING STARTED	9/18/80	1707
DRILLING COMPLETED	9/19/80	1752

DRILLER Pat Parmentier

GEOLOGIST Dave Robertson

RIG TYPE Mobile B56

REFERENCE POINT ground level

R.P. ELEVATION not yet surveyed 573.9

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 7 PAGES 72-73

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 24.5'

CASING DIAMETER 2"

CASING LENGTH 24'

SCREEN DIAMETER 2"

SCREEN SETTING 23.5' - 21.5'

SCREEN SLOT/TYPE .0001" slot-stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/20/80 @ 1017

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

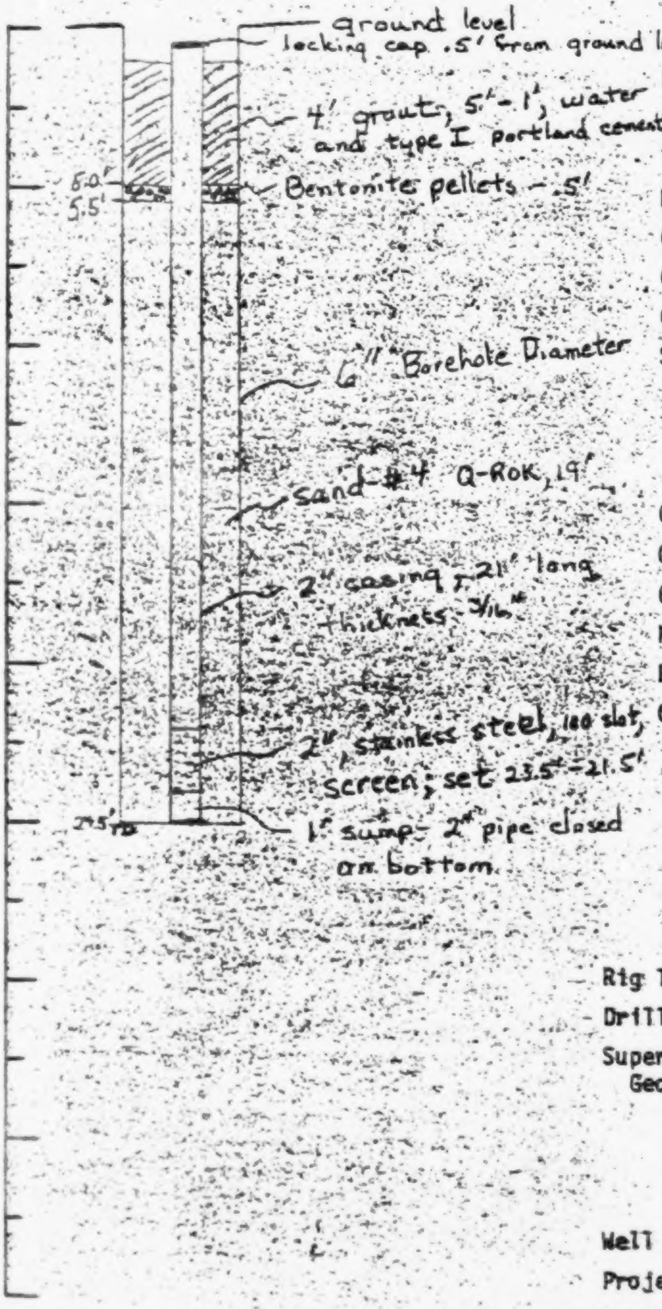
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

AS-BUILT DRAWING


ground level
locking cap .5' from ground level
4' grout; 5'-1', water and type I portland cement
6.0'
5.5'
Bentonite pellets - .5'
6" Borehole Diameter
sand #4 Q-ROK, 19'
2" casing, 21' long thickness 3/16"
2" stainless steel, 100 slot, screen; set 23.5'-21.5'
24.5' TD
1' sump 2" pipe closed on bottom

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Mobile B56
Driller Pat Parmentier
Supervisory Geologist David Robertson

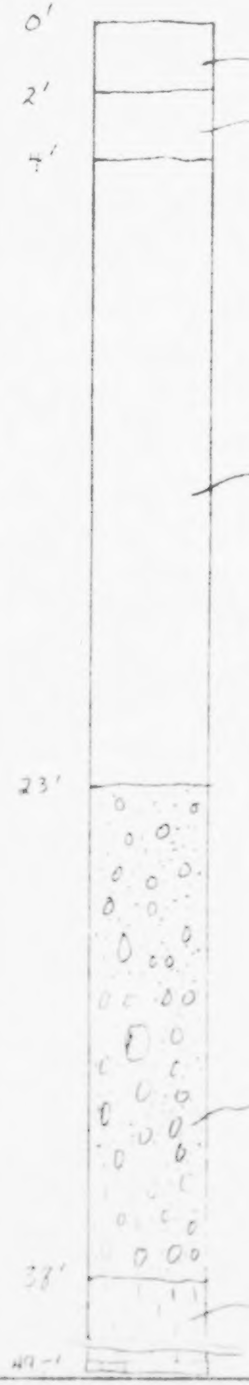
Well No. 546-A
Project Love Canal
Location SE corner of Read & 91st St.
Date 9/20/80

Prepared By: David Robertson
Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



dirt - dark brown powdery

sandy dirt - yellow to yellow brown

clay - brown to red brown with grey clay interspersed (marbled) - moisture varies with depth moist on top - wet on bottom

till - stones and pebbles in sandy clay matrix

Lockport Dolomite -

PROJECT Love Canal

OWNER City of Niagara Falls - Housing Auth.

WELL NO. 46-B

LOCATION SE corner of Read and 91st St.

	Date	Time
DRILLING STARTED	9/19/80	1242
DRILLING COMPLETED	9/22/80	1530

DRILLER Roger Logel

GEOLOGIST David Robertson

RIG TYPE CME-45C

REFERENCE POINT ground level

R.P. ELEVATION not yet surveyed 573.9

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 7 PAGES 66-71

WELL DATA

HOLE DIAMETER 6" - 4 3/4 - 2"

HOLE DEPTH 49.5'

CASING DIAMETER 4"

CASING LENGTH 38'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none

Depth to bedrock 38'

PUMP TEST DATA

STATIC DEPTH TO WATER 4.7'

DATE MEASURED 9/22/80 @ 1530

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

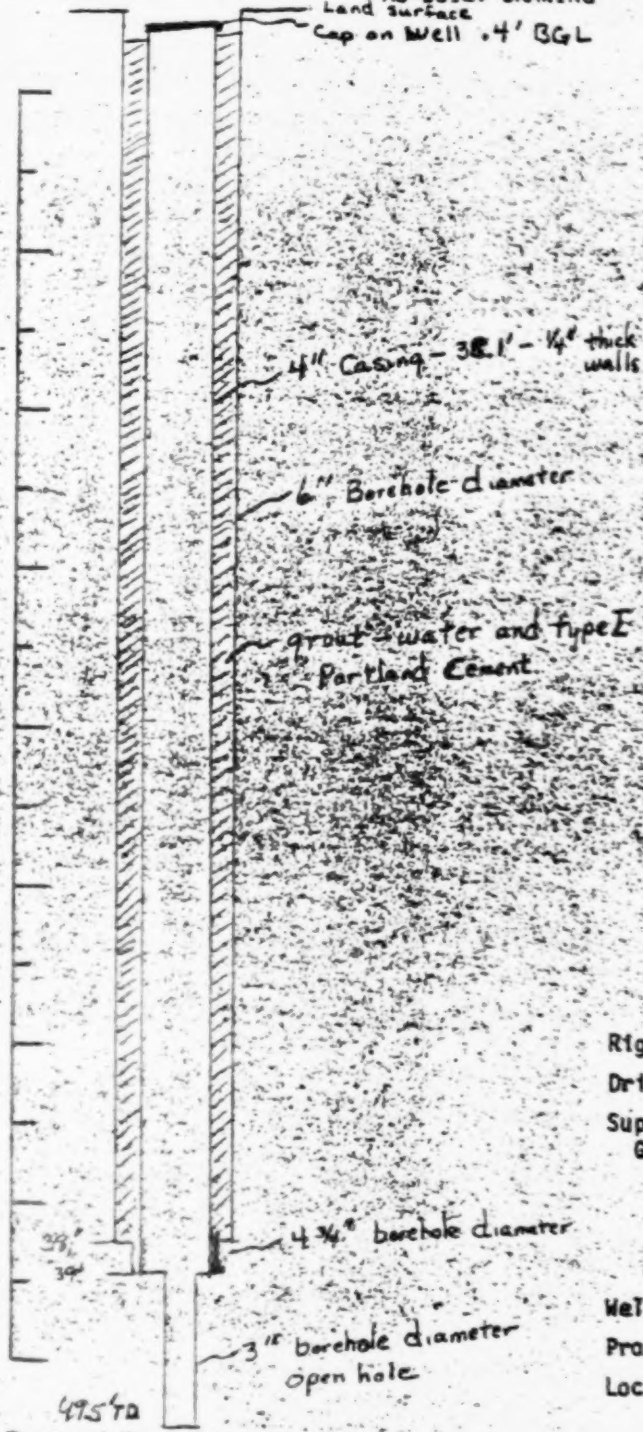
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING


Land surface
Cap on Well .4' BGL
4" Casing - 38.1' - 1/4" thick walls
6" Borehole diameter
grout - water and type I Portland Cement
4 3/4" borehole diameter
38'
39'
3" borehole diameter open hole
495' TD

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
- Material
- Diameter
- Slot Openings
- Settings

Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist David Robertson

Well No. 46-B

Project Love Canal

Location SE corner of Read and 91st St.

Date 9/20/80

Prepared By: David Robertson

Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
0	
	BROWN SILTY CLAYEY LOAM
1.5'	
	REDDISH BROWN SILTY CLAY
4'	
	GRAY REDDISH BROWN SILTY CLAY
7'	
	GRAY REDDISH BROWN SILTY CLAY MOIST
10	
	GRAY BROWN CLAY MOIST PLASTIC.
21.5'	
	TILL
23'	

PROJECT Love Canal

OWNER Unknown

WELL NO. 47-A

LOCATION NE corner of intersection of 93rd St. and Colvin Blvd.

	Date	Time
DRILLING STARTED	9/17/80	0735
DRILLING COMPLETED	9/17/80	0940

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT ground surface

R.P. ELEVATION not surveyed 571.9

TOPO POSITION flat lying

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 47-48

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 23'

CASING DIAMETER 2"

CASING LENGTH 22.5'

SCREEN DIAMETER 2"

SCREEN SETTING 22'-20'

SCREEN SLOT/TYPE .0001 Johnson stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/17/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

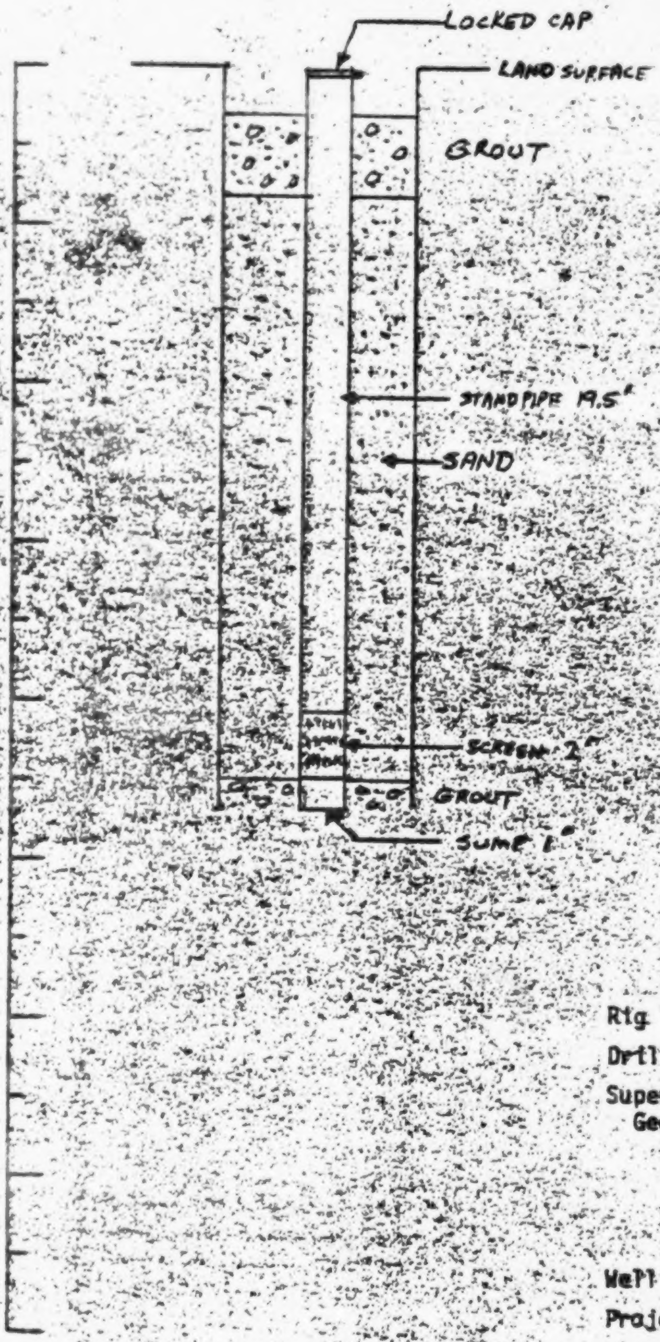
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S — .5'
Total Depth 23'
Borehole Diameter 6"
Casing Diameter 2"
Casing Thickness 3/16"
Casing Lengths 22.5
Screen Data
  Material STAINLESS STEEL
  Diameter 2"
  Slot Openings .001 INCHES
  Settings 20-22 FEET
Centralizers —
Grout Type PORTLAND TYPE II
Gravel Pack QUARTZ SAND
K-Fittings —
Packers —
Cement Baskets —

Rig Type ACKER AD-2
Driller ED COLE
Supervisory Geologist DENNIS STANCZUK

Well No. 47 A
Project LOVE CANAL
Location NE CORNER OF THE INTERSECTION OF 93RD ST AND COLVIN BLVD
Date 9/17/80

Prepared By: DENNIS T. STANCZUK
Scale: 1 INCH = 5 FEET

WELL LOG

PROFILE	DESCRIPTION
	SILTY CLAYEY LIGHT BROWN LOAM
2'	
	SILTY CLAY REDDISH BROWN
4'	
	SILTY CLAY GRAY REDDISH BROWN
6'	
	SILTY CLAY GRAY REDDISH BROWN MOIST
7.5'	
	CLAY SOFT GRAY REDDISH BROWN FLECKS OF GLASS
9'	
	CLAY GRAY BROWN, SILTY & GLASS, PLASTI
10'	
	CLAY GRAY BROWN WET PASTE
17'	
	CLAY GRAY BROWN, SLURRY
22.5'	
	TILL, GRAVEL SOFT
26.5'	
	TILL HARD
30.2'	
	LOCKPORT DOLOMITE
34.3'	

PROJECT Love Canal

OWNER Unknown

WELL NO. 47-B

LOCATION NE corner of the intersection of 93rd St. and Colvin Blvd: 16m north of curb line, 16m east of curbline

	Date	Time
DRILLING STARTED	9/16/80	0720
DRILLING COMPLETED	9/16/80	1900

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 571.9

TOPO POSITION flat lying

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 41-46

WELL DATA

HOLE DIAMETER 6" auger/3" roller bit

HOLE DEPTH 30.2' / 34.3'

CASING DIAMETER 2"

CASING LENGTH 31.5'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 30.2'

PUMP TEST DATA

STATIC DEPTH TO WATER 7.76'

DATE MEASURED 9/16/80 1840

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

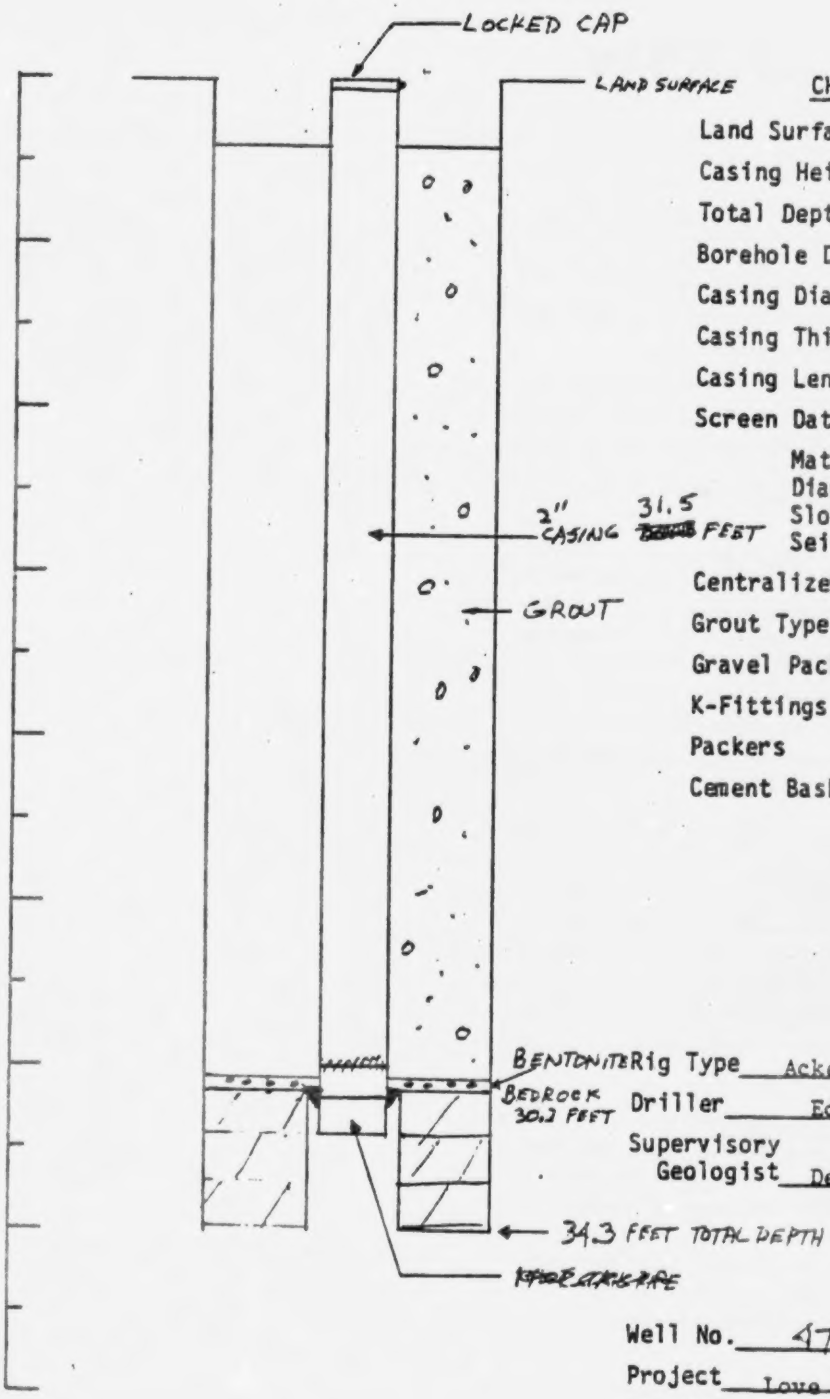
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation

Casing Height Above L-S Flush

Total Depth 34.3'

Borehole Diameter 6" auger/ 3" roller bit

Casing Diameter 2"

Casing Thickness 3/16"

Casing Lengths 31.5'

Screen Data N/A

- Material
- Diameter
- Slot Openings
- Seitings

Centralizers none

Grout Type Portland Type II

Gravel Pack 04 Qtz. sand

K-Fittings none

Packers none

Cement Baskets none

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist Dennis Stanczuk

Well No. 47 B

Project Love Canal

Location NE corner of the intersection of 93rd St. and Colvin Blvd.

Date 9/16/80

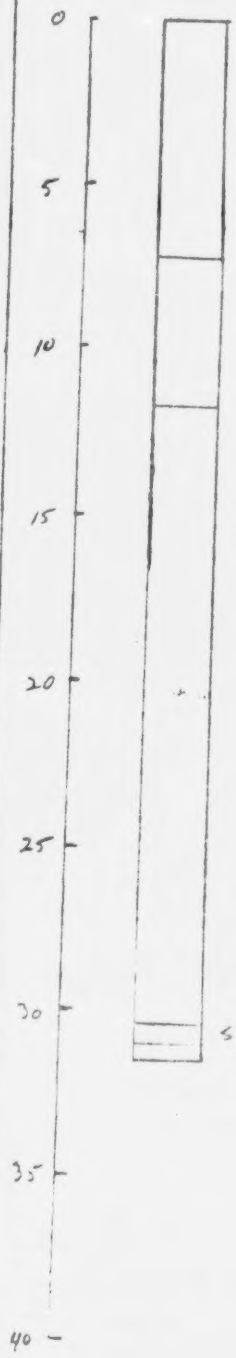
Prepared By: Dennis Stanczuk

Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



Brown topsoil

Clay loam, silty

Soft Clay

silty zone at 31'
33 bottom of well

PROJECT Love Canal
OWNER Angelo Fama
WELL NO. 48-A
LOCATION Lot - 10114 Buffalo Ave.

	Date	Time
DRILLING STARTED	9/22/80	1300
DRILLING COMPLETED	9/23/80	1030

DRILLER Pat Parmentier
GEOLOGIST Tom Farmer, Al Wickline
RIG TYPE Mobile B-56
REFERENCE POINT land surface
R.P. ELEVATION not surveyed 574.6
TOPO POSITION flat
PROFILE BY Tom Farmer
FIELD BOOK NO. 11 PAGES 1-6

WELL DATA

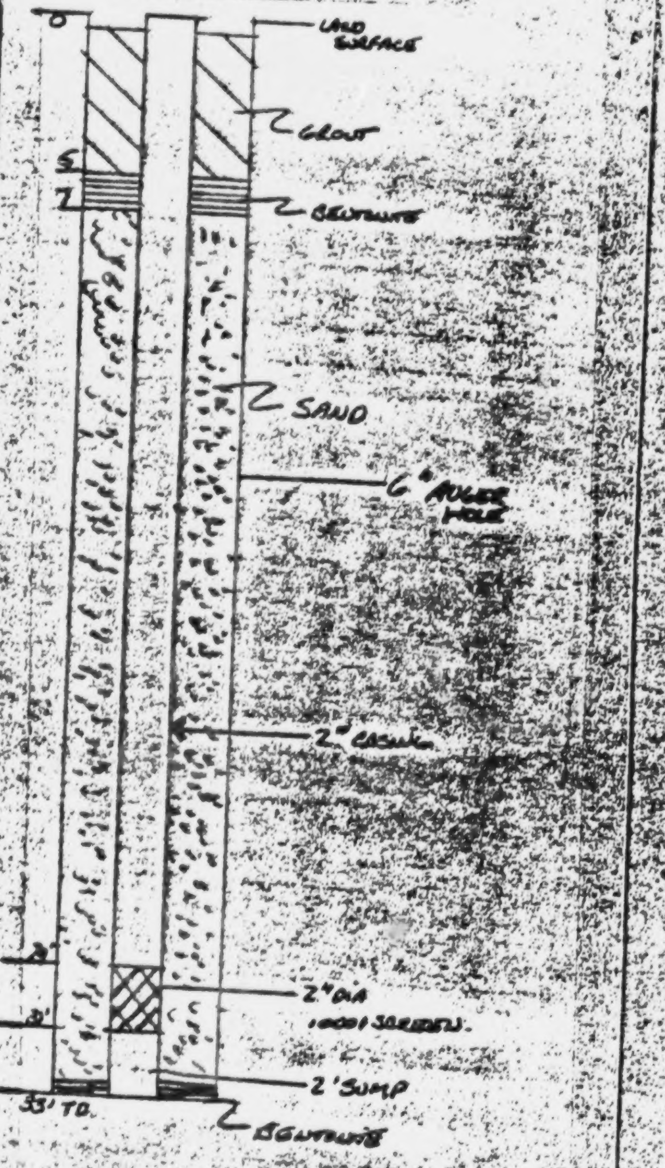
HOLE DIAMETER 6"
HOLE DEPTH 33'
CASING DIAMETER 2"
CASING LENGTH 33'
SCREEN DIAMETER 2"
SCREEN SETTING 29'-31'
SCREEN SLOT/TYPE .0001" stainless

PUMP TEST DATA

STATIC DEPTH TO WATER 2.55'
DATE MEASURED 9/23/80
PUMPING DEPTH TO WATER not measured
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Alfred Wickline
Tom Farmer

Well No. 48-A
Project Love Canal
Location Lot - 10114 Buffalo Ave
underpass
Date 9-23-80

Prepared By: Al Wickline & Tom Farmer
Scale: 1"=5'

WELL LOG

	PROFILE	DESCRIPTION
0		LAND SURFACE
		DARK BROWN SILT LOAM TOPSOIL
	3'	Brown SILT LOAM SUBSOIL INCREASE IN MOISTURE NEAR bottom of this layer
5		
	7'	REDDISH BROWN CLAY LOAM Gradual increase in moisture
10		
	12'	
15		GRAY CLAY SILT STRINGERS very STICKY INCREASE IN MOISTURE NEAR BOTTOM
20		
25		
30		GRAY CLAY INCREASE IN SAND CONTENT AND MOISTURE
35		TILL
	38.5'	BEDROCK DOLOMITE
40		
		43.9

PROJECT Love Canal

OWNER Angelo Fama

WELL NO. 48-B

LOCATION Lot 10114 Buffalo Ave.

	Date	Time
DRILLING STARTED	9/22/80	1300
DRILLING COMPLETED	9/25/80	1310

DRILLER Mike Warner

GEOLOGIST Alfred Wickline & Tom Farmer

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not been surveyed 574.6

TOPO POSITION flat lying

PROFILE BY Alfred Wickline

FIELD BOOK NO. 6 & 11 PAGES 61-63/5,11

WELL DATA

HOLE DIAMETER 4"

HOLE DEPTH 43.9'

CASING DIAMETER 4"

CASING LENGTH 38'

SCREEN DIAMETER N/

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 38.5' -

PUMP TEST DATA

STATIC DEPTH TO WATER not measured

DATE MEASURED

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

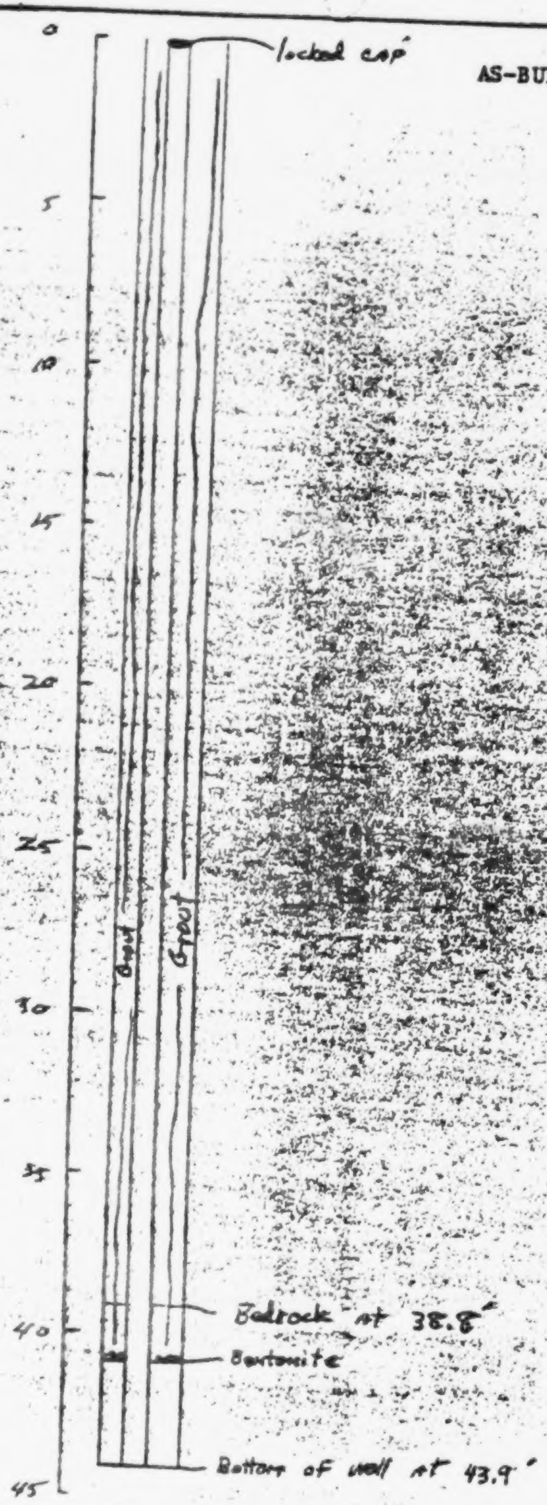
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation

Casing Height Above L-S 0

Total Depth 4 [illegible]

Borehole Diameter

Casing Diameter

Casing Thickness

Casing Lengths

Screen Data

- Material
- Diameter
- Slot Openings
- Settings

Centralizers

Grout Type

Gravel Pack

K-Fittings

Packers

Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Tom Farmer

Well No. 48-B

Project Love Canal

Location Lot 10114 Buffalo Ave.

Date 9/30/80

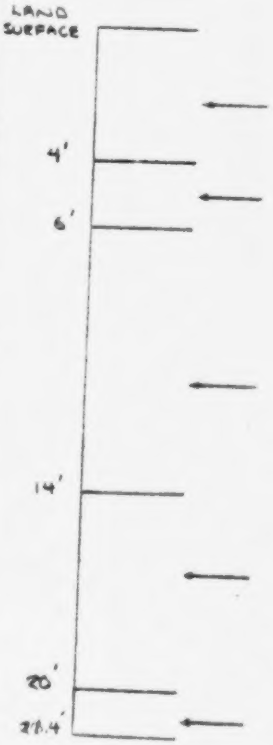
Prepared By: Tom Farmer

Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN SILT LOAM, SOMEWHAT DRY

YELLOW BROWN LOAM, PEBBLES SOMEWHAT DRY.

DULL RED BROWN SILTY CLAY LOAM, MOIST

DARK GRAY BROWN SILTY CLAY, MOIST. PLASTIC

BROWNISH GRAY SILTY CLAY, VERY WET, VERY PLASTIC

SCALE: 1" = 5'

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 49-A

LOCATION Directly behind property line for 746/742 97th St.

	Date	Time
DRILLING STARTED	9/16/80	1622
DRILLING COMPLETED	9/16/80	1728

DRILLER Joe Genovese

GEOLOGIST Phil Spooner

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 574.3

TOPO POSITION flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 17-18

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 21.4'

CASING DIAMETER 2"

CASING LENGTH 21'

SCREEN DIAMETER 2"

SCREEN SETTING 18'-20'

SCREEN SLOT/TYPE .0001" Stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/16/80 1643

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

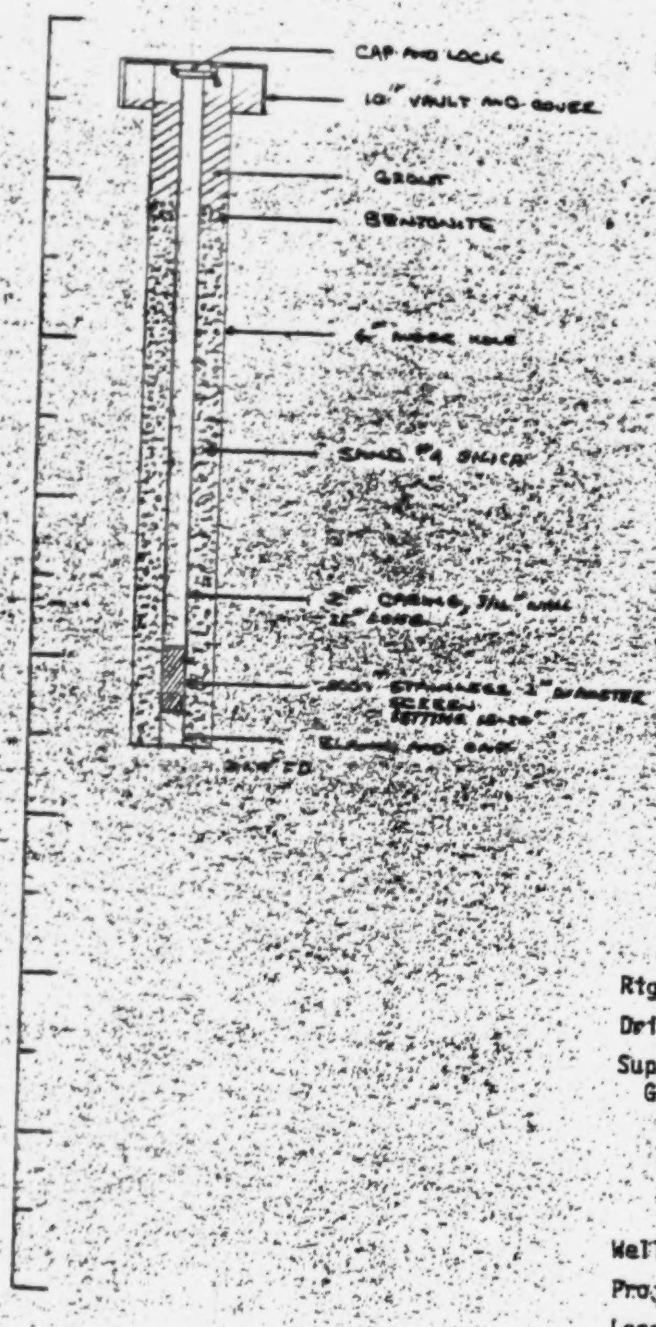
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45
Driller Joe Genovese
Supervisory Geologist Phil Spooner

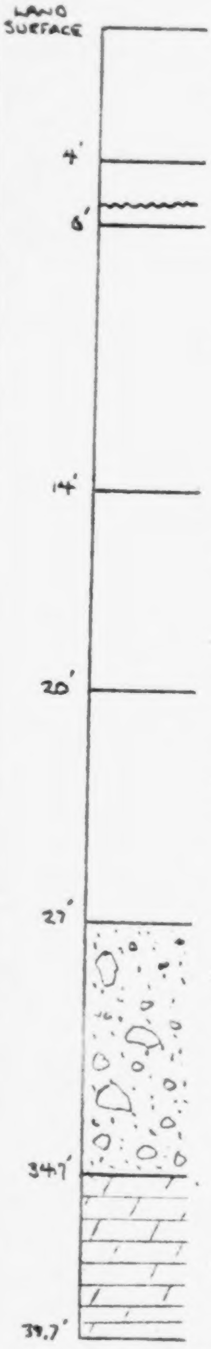
Well No. 49-A
Project Love Canal
Location Behind 746/742 97th St.

Prepared By: Phil Spooner
Scale: 1"=5'

Date 9/16/80

WELL LOG

PROFILE



SCALE: 1" = 5'

DESCRIPTION

DARK BROWN SILT LOAM, SOMEWHAT DRY

YELLOW BROWN LOAM, FEW PEBBLES SOMEWHAT MOIST

DULL RED BROWN SILTY CLAY LOAM, MOIST

DARK GRAY BROWN SILTY CLAY, MOIST, PLASTIC

BROWNISH GRAY SILTY CLAY, VERY WET, VERY PLASTIC

GLACIAL TILL

LOCKPORT DOLOMITE

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 49-B

LOCATION Directly behind property line dividing 746 and 742 97th St.

	Date	Time
DRILLING STARTED	9/15/80	1526
DRILLING COMPLETED	9/16/80	1609

DRILLER Joe Genovese

GEOLOGIST Phil Spooner

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 574.3

TOPO POSITION flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 12-17

WELL DATA

HOLE DIAMETER 6" - 2 15/16

HOLE DEPTH Total 39.7'

CASING DIAMETER 2"

CASING LENGTH 35.9'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none

DEPTH TO BEDROCK 34.7'

PUMP TEST DATA

STATIC DEPTH TO WATER 5.4'

DATE MEASURED 9/16/80 1426

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

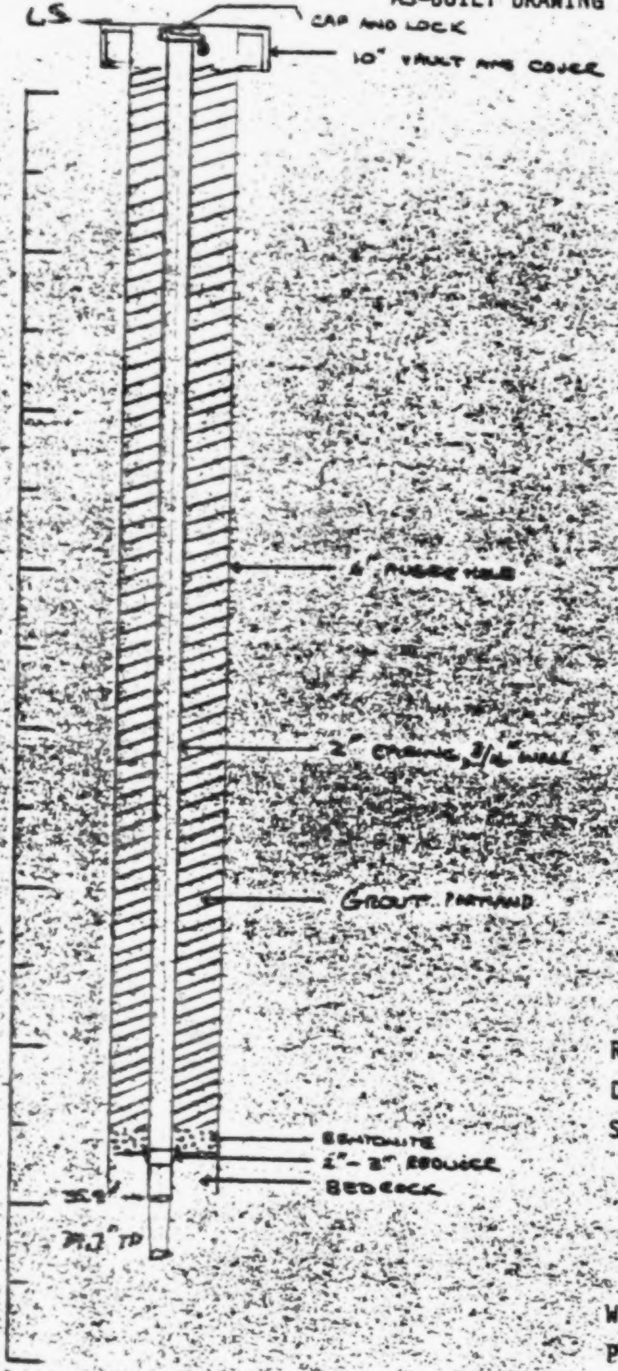
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45

Driller Joe Genovese

Supervisory Geologist Phil Spooner

Well No. 49-B

Project Love Canal

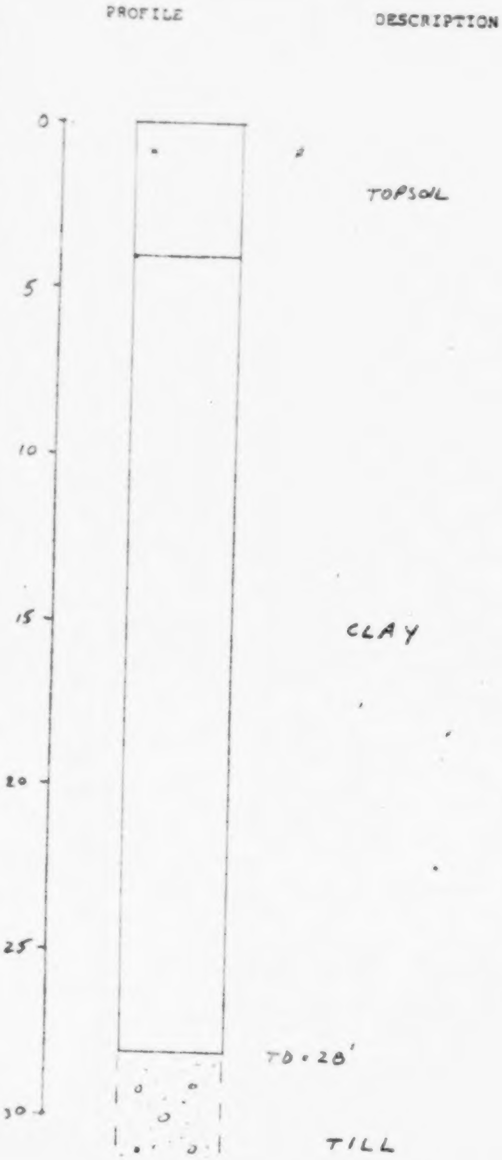
Location Behind 746/742 97th St.

Prepared By: Phil Spooner

Scale: 1"=5'

Date 9-17-80

WELL LOG



SCALE: 1" = 5'

DRY WELL

PROJECT	Love Canal
OWNER	City of Niagara Falls
WELL NO.	50-A
LOCATION	NE corner 96th St. And Frontier Rd.

	Date	Time
DRILLING STARTED	9/16/80	0720
DRILLING COMPLETED	9/16/80	0935

DRILLER Mike Warner

GEOLOGIST Dave Conover

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573.9

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 45

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 28'

CASING DIAMETER 2"ID

CASING LENGTH 24', 2'

SCREEN DIAMETER 2"

SCREEN SETTING 24' to 26'

SCREEN SLOT/TYPE Horz. slot, stainless, .0001" ~~.010~~" slot SIZE

PUMP TEST DATA

STATIC DEPTH TO WATER Dry

DATE MEASURED 9/16/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

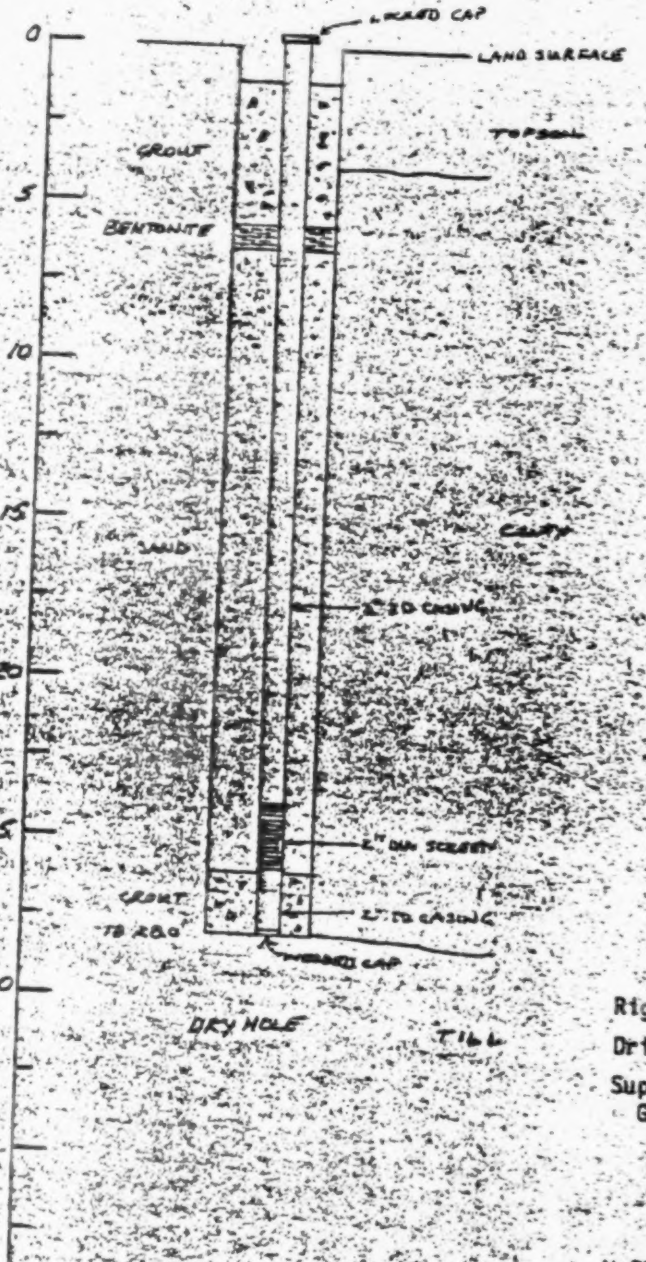
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Well setting based on Gamma Log

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S 0.1"
Total Depth 28'
Borehole Diameter 6"
Casing Diameter 2"ID
Casing Thickness 3/16"
Casing Lengths 24" - 2"
Screen Data

Material Stainless
Diameter 2"
Slot Openings ~~.010"~~ .0001
Seitings 29-26'

Centralizers None
Grout Type Portland Cement Type
Gravel Pack #4 Quartzite
K-Fittings None
Packers None
Cement Baskets None

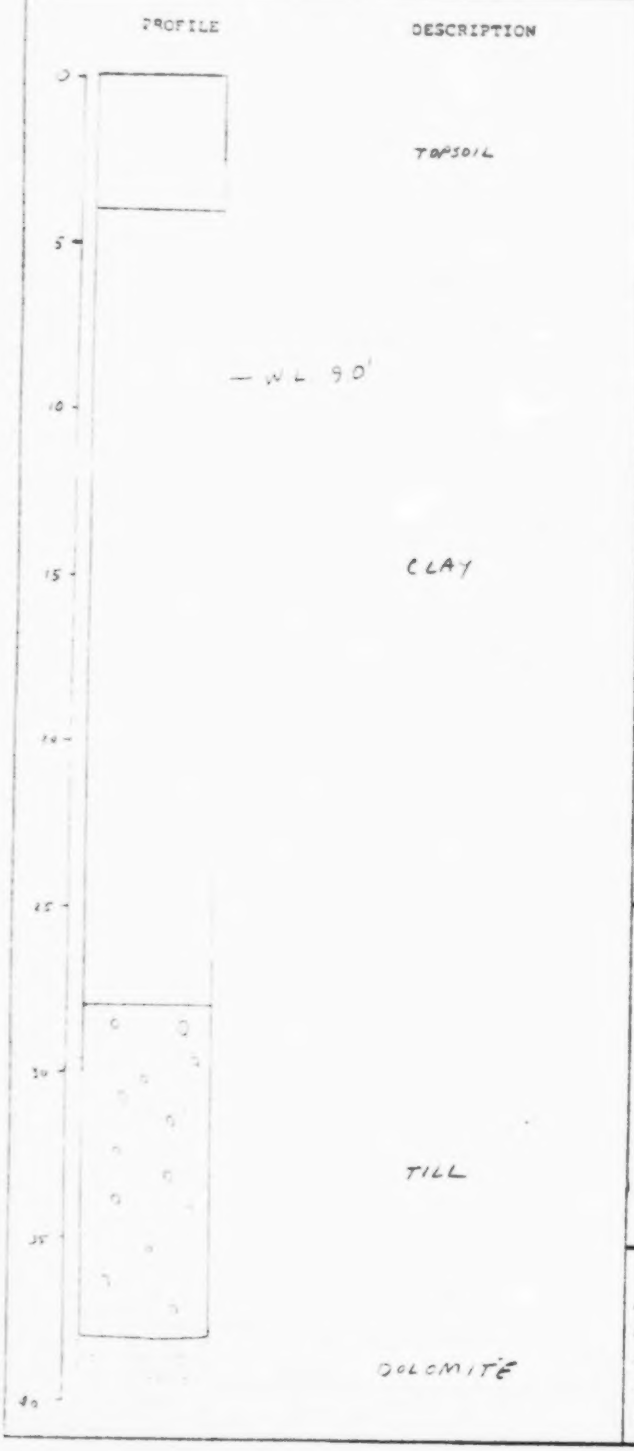
Rig Type CME-55
Driller Mike Warner
Supervisory Geologist Dave Conover

Well No. 50-A
Project Love Canal
Location NE corner 96th St. and Frontier Rd.
Date 9/16/80

Prepared By: Dave Conover
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 50-B

LOCATION NE corner of 96th St. and Frontier Rd.

	Date	Time
DRILLING STARTED	9/15/80	0750
DRILLING COMPLETED	9/16/80	1407

DRILLER Mike Warner

GEOLOGIST Dave Conover

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573.9

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 41-48

WELL DATA

HOLE DIAMETER 6", 3"

HOLE DEPTH 38' of 6", 5' of 3"

CASING DIAMETER 2"ID

CASING LENGTH 38' reducer, 4" tailpipe

SCREEN DIAMETER none placed

SCREEN SETTING " "

SCREEN SLOT/TYPE " "

DEPTH TO BEDROCK 38'

PUMP TEST DATA

STATIC DEPTH TO WATER 9.0'

DATE MEASURED 9/16/80 1635

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

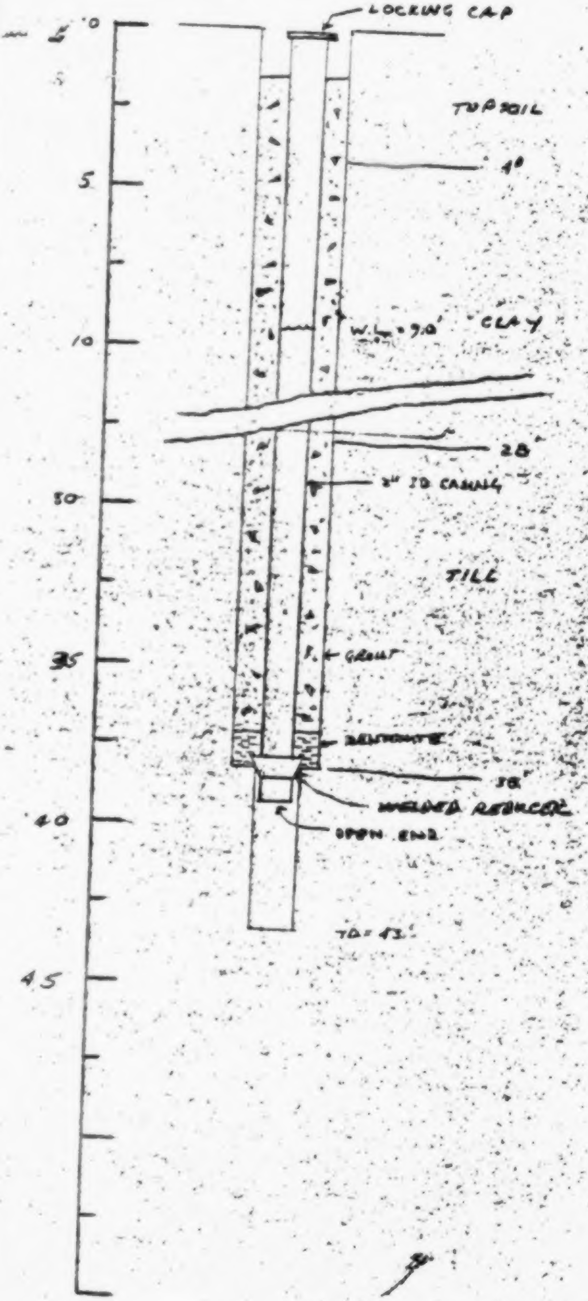
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

3" diameter hole drilled 5', only 3' open reducer and 1' tailpipe lost in hole

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation

Casing Height Above L-S .2'

Total Depth 41.3'

Borehole Diameter 6", 3"

Casing Diameter 2"ID

Casing Thickness 3/16"

Casing Lengths 38', .3'

Screen Data None used

Material

Diameter

Slot Openings

Seitings

Centralizers None

Grout Type Portland Cement TypeI

Gravel Pack None

K-Fittings None

Packers None

Cement Baskets None

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dave Conover

Well No. 50-B

Project Love Canal

Location NE corner 96th St. and Frontier Rd.

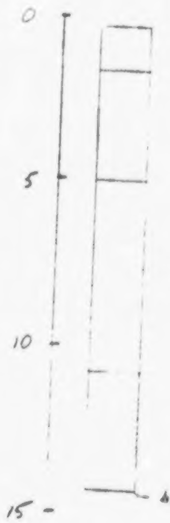
Date 9/15/80

Prepared By: Dave Conover

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



dark brown topsoil

light brown clay

reddish brown clay

brown clay

bottom of hole 14'

PROJECT Love Canal
OWNER Willard Belden
WELL NO. 51-A
LOCATION 728 101st St. - vacant lot on north side of house

	Date	Time
DRILLING STARTED	9/25/80	0755
DRILLING COMPLETED	9/25/80	1045

DRILLER Ron Bush
GEOLOGIST Tom Farmer
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION not surveyed
TOPO POSITION flat
PROFILE BY Tom Farmer
FIELD BOOK NO. 11 PAGES 10

WELL DATA

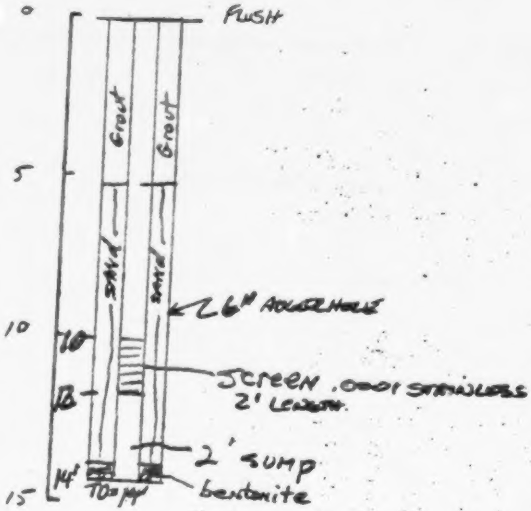
HOLE DIAMETER 6"
HOLE DEPTH 14'
CASING DIAMETER 2"
CASING LENGTH 14'
SCREEN DIAMETER 2"
SCREEN SETTING 10'-12'
SCREEN SLOT/TYPE .0001 stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry Hole
DATE MEASURED 9/25/80
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Tom Farmer

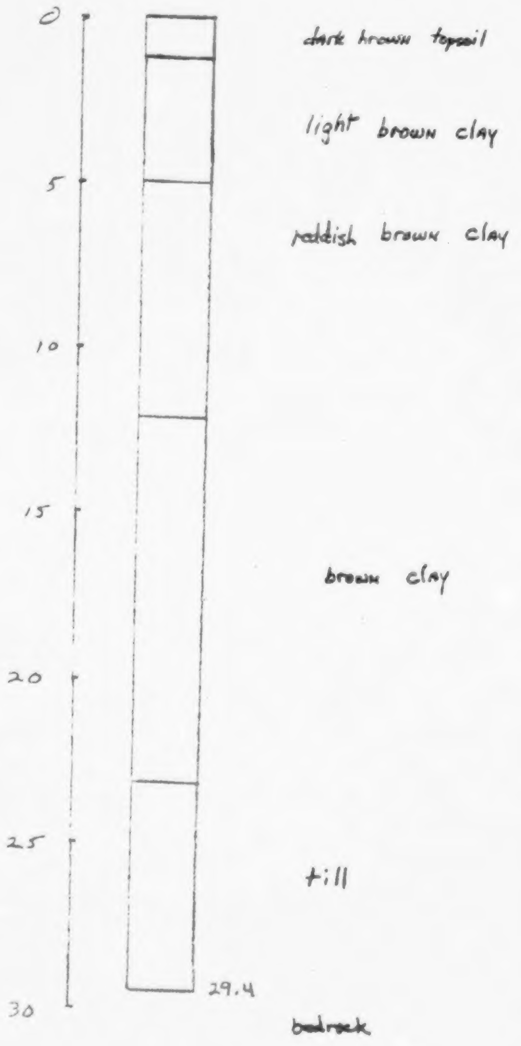
Well No. 51-A
Project Love Canal
Location 728 101st St.- vacant lot on north side of house

Date 9/29/80

Prepared By: Tom Farmer
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER Willard Belden

WELL NO. 51-B

LOCATION 728 101st St. - vacant lot on north side of house

	Date	Time
DRILLING STARTED	9/24/80	0930
DRILLING COMPLETED	9/24/80	1715

DRILLER Ron Bush

GEOLOGIST Tom Farmer

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not surveyed

TOPO POSITION not located - flat

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 PAGES 8-9

WELL DATA

HOLE DIAMETER 6" - 2 15/16

HOLE DEPTH 34.5'

CASING DIAMETER 4"

CASING LENGTH 34.5'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 29.4'

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

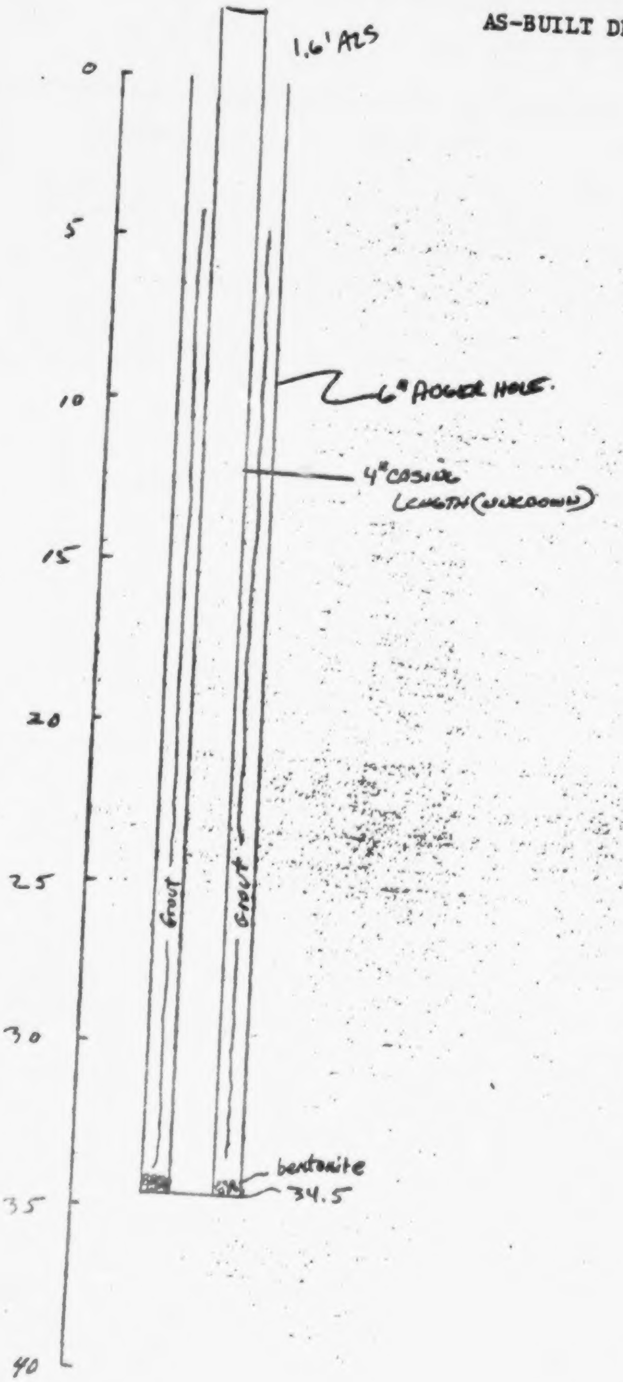
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Tom Farmer

Well No. 51-B

Project Love Canal

Location 728 101st St. - vacant lot on north side of house

Date 9/29/80

Prepared By: Tom Farmer

Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
0 – 1'	DARK BROWN SANDY LOAM TOPSOIL
1' – 4.5'	BROWN SANDY LOAM
4.5' – 5.5	BROWN SANDY LOAM INCREAS IN MOISTURE
5.5 – 12.5	BROWN SILTY CLAY LOAM DENSER
12.5 – 19.0'	GRAY BROWN CLAY WITH SILT STRINGERS
19.0' – 25'	GRAY CLAY INCREASE IN MOISTURE
25' – 27'	TILL

PROJECT Love Canal

OWNER Paul Vogel

WELL NO. 52-A

LOCATION 490 103rd St, SE corner

	Date	Time
DRILLING STARTED	9/22/80	1055
DRILLING COMPLETED	9/22/80	1240

DRILLER Pat Parmentier

GEOLOGIST Alfred Wickline

RIG TYPE Mobile B-56

REFERENCE POINT land surface

R.P. ELEVATION ~~not surveyed~~ 575.9

TOPO POSITION flat lying

PROFILE BY Alfred Wickline

FIELD BOOK NO. PAGES

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 27'

CASING DIAMETER 2"

CASING LENGTH 26.5'

SCREEN DIAMETER 2"

SCREEN SETTING 23'-25'

SCREEN SLOT/TYPE .001 stainless

PUMP TEST DATA

STATIC DEPTH TO WATER 14.3'

DATE MEASURED 9/22/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

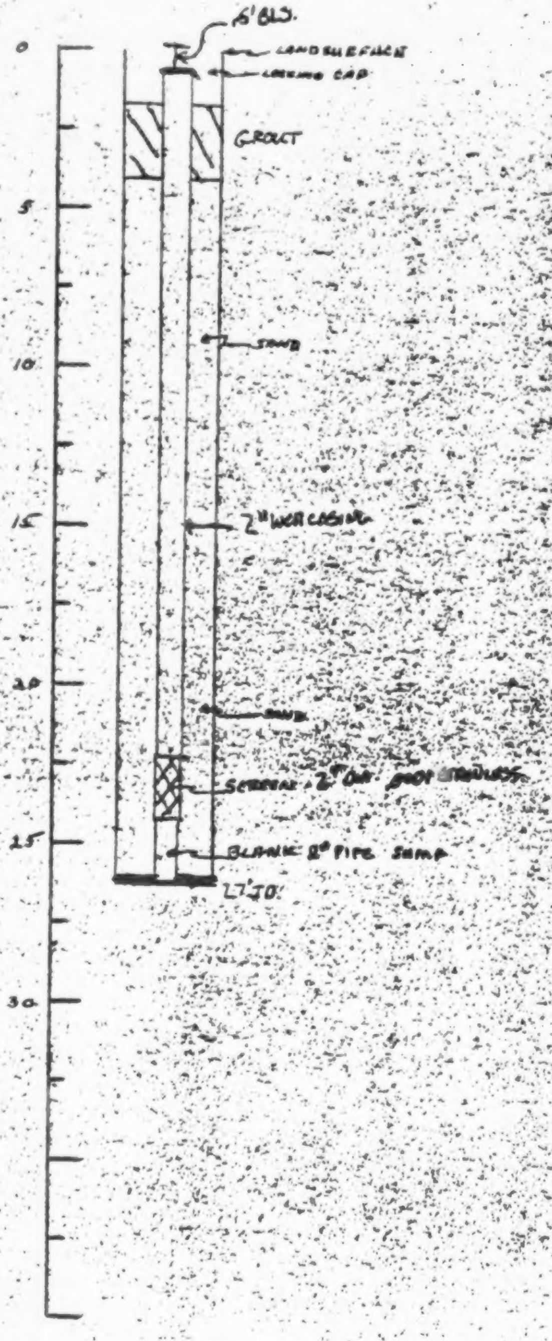
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Mobile B-56

Driller Pat Parmentier

Supervisory Geologist Alfred Wickline
Tom Farmer

Well No. 52-A

Project Love Canal

Location 490 103rd St. SE corner

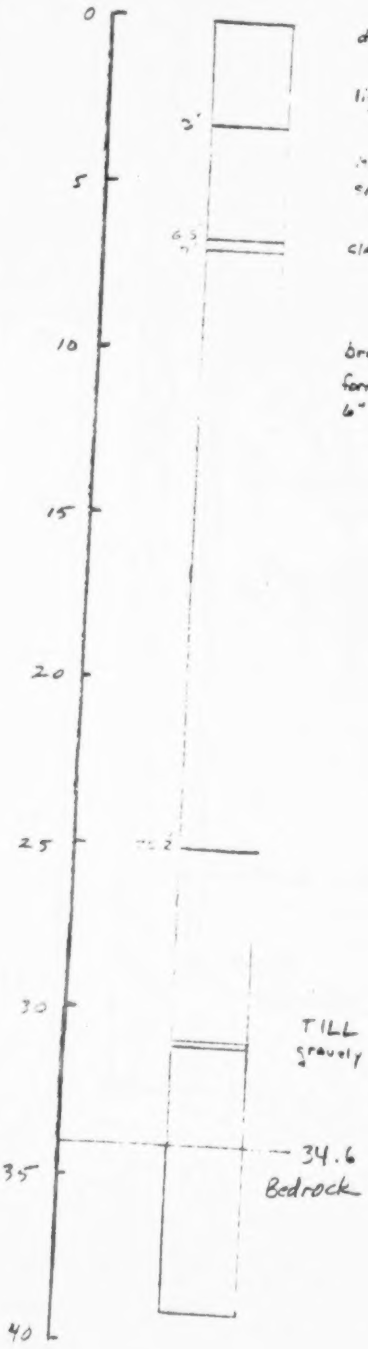
Prepared By: Alfred Wickline

Scale: 1"=5'

Date 9/22/80

WELL LOG

PROFILE



DESCRIPTION

dark brown soil at surface

light brown sandy clay soil

moist yellowish-brown sandy clay

clay forms loose balls about 1" in diameter

brown, sticky clay forms ribbons about 6" long

PROJECT Love Canal

OWNER Paul Vogel

WELL NO. 52-B

LOCATION 490 103rd St., SE Corner

	Date	Time
DRILLING STARTED	9/19/80	1419
DRILLING COMPLETED	9/23/80	1550

DRILLER Mike Warner

GEOLOGIST Dave Conover, Tom Farmer

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION unknown 575.9

TOPO POSITION flat lying

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 PAGES 1-7

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 39.6'

CASING DIAMETER 4"

CASING LENGTH 18.5'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 34.6'

PUMP TEST DATA

STATIC DEPTH TO WATER 6.7'

DATE MEASURED 9/22/80

PUMPING DEPTH TO WATER not measured

TEST DURATION

PUMPING RATE

TEST DATE

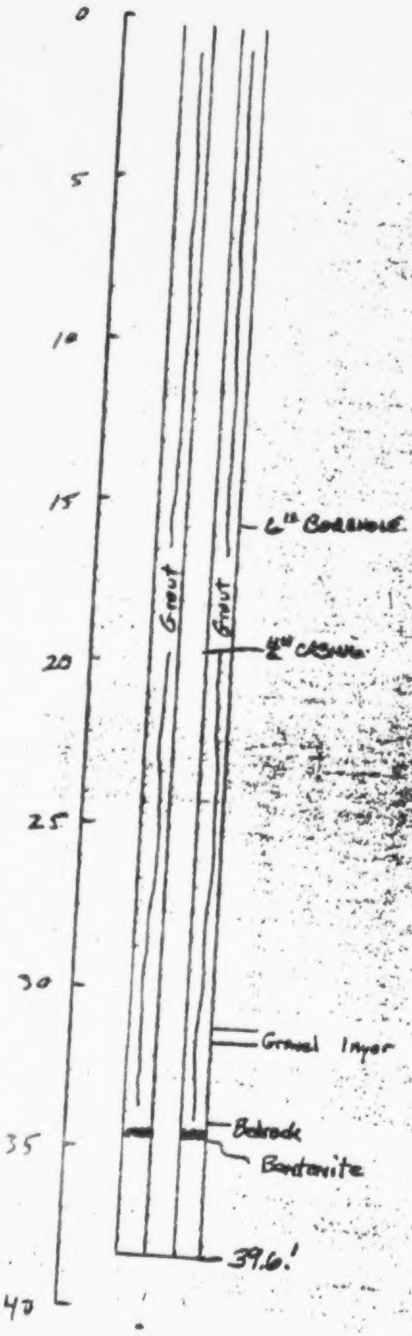
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Al Wickline, Dave Conover, Tom Farmer

Well No. 52-B

Project Love Canal

Location 490 103rd St., SE corner

Date 9/26/80

Prepared By: Tom Farmer

Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
	LAND SURFACE
1'	DARK BROWN SILT LOAM
	DARK REDDISH BROWN SILT LOAM MOIST
4'	
	BROWN SILT LOAM
7.6'	
	GRAY CLAY SILT AND SAND STRINGERS INCREASE IN MOISTURE
15	
	GRAY CLAY FEWER SILT STRINGERS INCREASE IN MOISTURE
20'	
	GRAY CLAY WET SILT + SAND STRINGERS
	GRAVELLY GRAY CLAY VERY WET
	TILL

PROJECT Love Canal
OWNER Mae Reeme Ryan
WELL NO. 54-A
LOCATION 758 Pasadena - in vacant lot south of house

	Date	Time
DRILLING STARTED	9/25/80	0712
DRILLING COMPLETED	9/25/80	0930

DRILLER Mike Warner
GEOLOGIST Alfred Wickline
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION not surveyed 570.9
TOPO POSITION along creek flood plain
PROFILE BY Alfred Wickline
FIELD BOOK NO. 6 PAGES 71-72

WELL DATA

HOLE DIAMETER 4"
HOLE DEPTH 29'
CASING DIAMETER 2"
CASING LENGTH 28.5'
SCREEN DIAMETER 2"
SCREEN SETTING 25'-27'
SCREEN SLOT/TYPE .0001 -Stainless

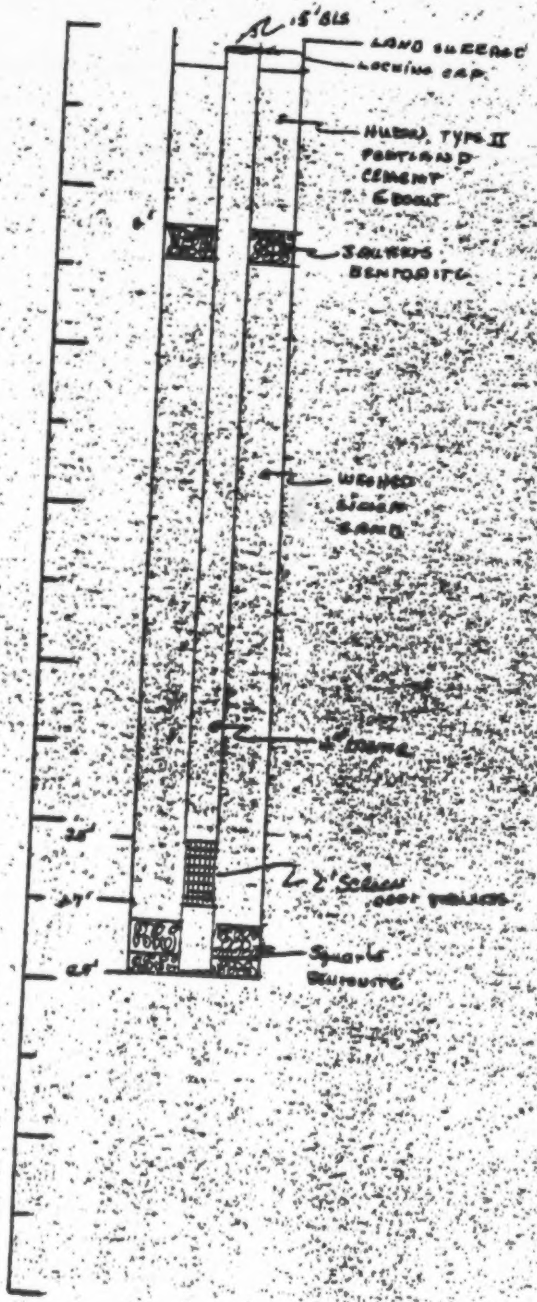
PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 9/25/80 @ 0930
PUMPING DEPTH TO WATER N/A
TEST DURATION N/A
PUMPING RATE N/A
TEST DATE N/A
TEST TYPE N/A
PUMP SETTING N/A
SPECIFIC CAPACITY N/A

REMARKS

Area was a brick yard approx. 50 years ago

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Alfred Wickline

Well No. 54-A

Project Love Canal

Location 758 Pasadena - in vacant lot south of house

Date 9/25/80

Prepared By: Alfred Wickline

Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
0	LAND SURFACE
1'	DARK BROWN SILT LOAM MOIST
	DARK REDDISH BROWN SILT LOAM INCREASE IN MOISTURE
4'	
5'	
	BROWN SILT LOAM MOIST
7.5'	
10'	GRAY CLAY SILT STRINGERS VERY WET
15'	
	GRAY CLAY FEWER SILT STRINGERS INCREASE IN MOISTURE
20	
	GRAY CLAY WET INCREASE IN SILT AND SAND STRINGERS
25'	
26'	
	GRAVELLY GRAY CLAY VERY WET
27'	
	GRAY TILL HARD
30	
33	GRAVELLY TILL-LIKE LARGER PEBBLES
	BED ROCK
35	

PROJECT Love Canal

OWNER Mae Reene Ryan

WELL NO. 54-B

LOCATION 758 Pasadena Ave. - in vacant lot south of house

	Date	Time
DRILLING STARTED	9/24/80	0930
DRILLING COMPLETED	9/26/80	1550

DRILLER Mike Warner

GEOLOGIST Alfred Wickline

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not surveyed yet 570.9

TOPO POSITION along creek (flood plain)

PROFILE BY Alfred Wickline

FIELD BOOK NO. 6 PAGES 64-71

WELL DATA

HOLE DIAMETER 4"

HOLE DEPTH 38.2'

CASING DIAMETER 4"

CASING LENGTH 32.5'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 33'

PUMP TEST DATA

STATIC DEPTH TO WATER 8.4' from land surface

DATE MEASURED 9/24/80 @ 1710

PUMPING DEPTH TO WATER not been pumped

TEST DURATION N/A

PUMPING RATE N/A

TEST DATE N/A

TEST TYPE N/A

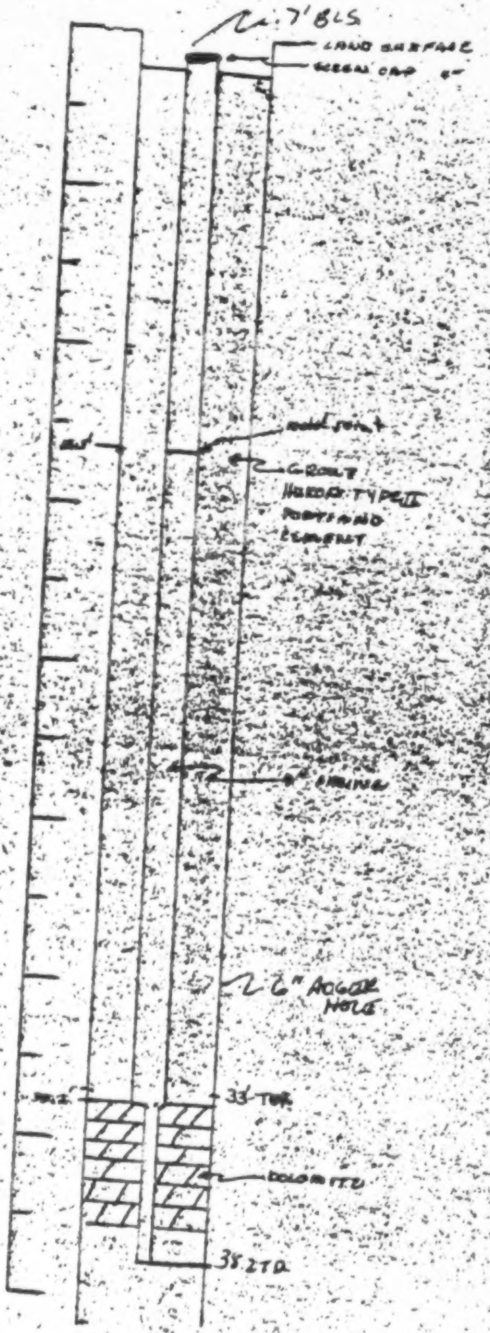
PUMP SETTING N/A

SPECIFIC CAPACITY N/A

REMARKS

Owners adjacent to 758 noted that when creek rises water enters their basement. Water in hole has a sewer or creek like smell.

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Mike Warner
Supervisory Geologist Alfred Wickline

Well No. 54-B
Project Love Canal
Location 758 Pasadena Ave. - in vacant lot south of house
Date 9/25/80

Prepared By: Alfred Wickline
Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
G.L.	TOPSOIL AND VEGETATION
1.5	YELLOW LOAM - VERY DRY - EVIDENCE OF ROOTS.
5	DRY - REDDISH BROWN LOAM.
8	MOIST - SILTY CLAY. RED.
13	PEBBLES IN RED CLAY
14	TILL MOIST WITH REDDISH MATRIX.
15	DRY TILL WITH MUCH GRAVEL.
18	WET - TILL RED MATRIX
20	BOULDER
20.5	MOIST TILL WITH RED MATRIX - DOLOMITE PEBBLES.
21.5	

1" = 5'

PROJECT Love Canal

OWNER Unknown

WELL NO. 55-A

LOCATION 629 102nd St.

	Date	Time
DRILLING STARTED	9/23/80	1420
DRILLING COMPLETED	9/23/80	1645

DRILLER Pat Parmentier

GEOLOGIST Ed Tokarski

RIG TYPE Mobile B-56

REFERENCE POINT ground level

R.P. ELEVATION not surveyed 573.8

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 21.5'

CASING DIAMETER 2"

CASING LENGTH 20.1'

SCREEN DIAMETER 2"

SCREEN SETTING 17.5' - 19.5'

SCREEN SLOT/TYPE .0001 stainless .0001

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/23/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

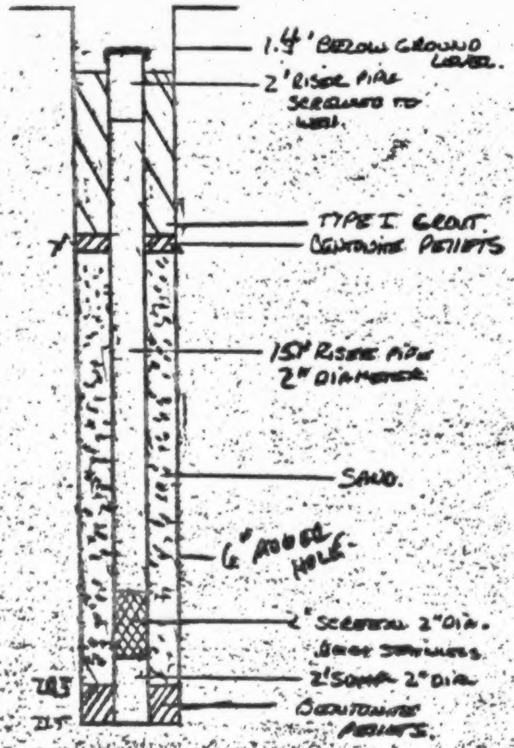
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Well delivered 2' short, hole - 5" long added 1.5' piece of pipe to top - still 1.4' BLS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Mobile B-56
Driller Pat Parmentier
Supervisory Geologist Ed Tokarski

Well No. 55-A
Project Love Canal
Location 629 102nd St.

Prepared By: Ed Tokarski
Scale: 1"=5'

Date 9/23/80

WELL LOG

PROFILE	DESCRIPTION
0	
	TOPSOIL/VEGETATION
2'	
	YELLOW LOAM. VERY DRY
8'	
	DRY BROWN/RED SILTY LOAM
8'	
	MOIST BROWN/RED-SILTY LOAM
13'	
	PEBBLES/BOULDER.
14'	
	TILL (14') MOIST REDDISH BROWN MATRIX
15'	
	DRY TILL
18'	
	WET TILL
20'	
	GRAVEL IN TILL
22'	
	TILL-MOIST
24'	
	GRAVEL IN ZONE
26'	
	BOULDER
26.5	
	DRY TILL
28'	
	MOIST TILL
29.5'	
	BOULDER
30'	
30.8'	DOLOMITE
15	

PROJECT Love Canal

OWNER Unknown

WELL NO. 55-B

LOCATION 629 102nd St.

	Date	Time
DRILLING STARTED	9/23/80	0810
DRILLING COMPLETED	9/27/80	1035

DRILLER Roger Logel

GEOLOGIST Ed Tokarski

RIG TYPE CME-45C

REFERENCE POINT ground level

R.P. ELEVATION not surveyed 573.8

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES 21-25, 35

WELL DATA

HOLE DIAMETER 6" - 2"

HOLE DEPTH 36.3'

CASING DIAMETER 4"

CASING LENGTH 31.0'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 30.8'

PUMP TEST DATA

STATIC DEPTH TO WATER Top of pipe / 9.3'

DATE MEASURED 9/25/80 9/27/80@1035

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

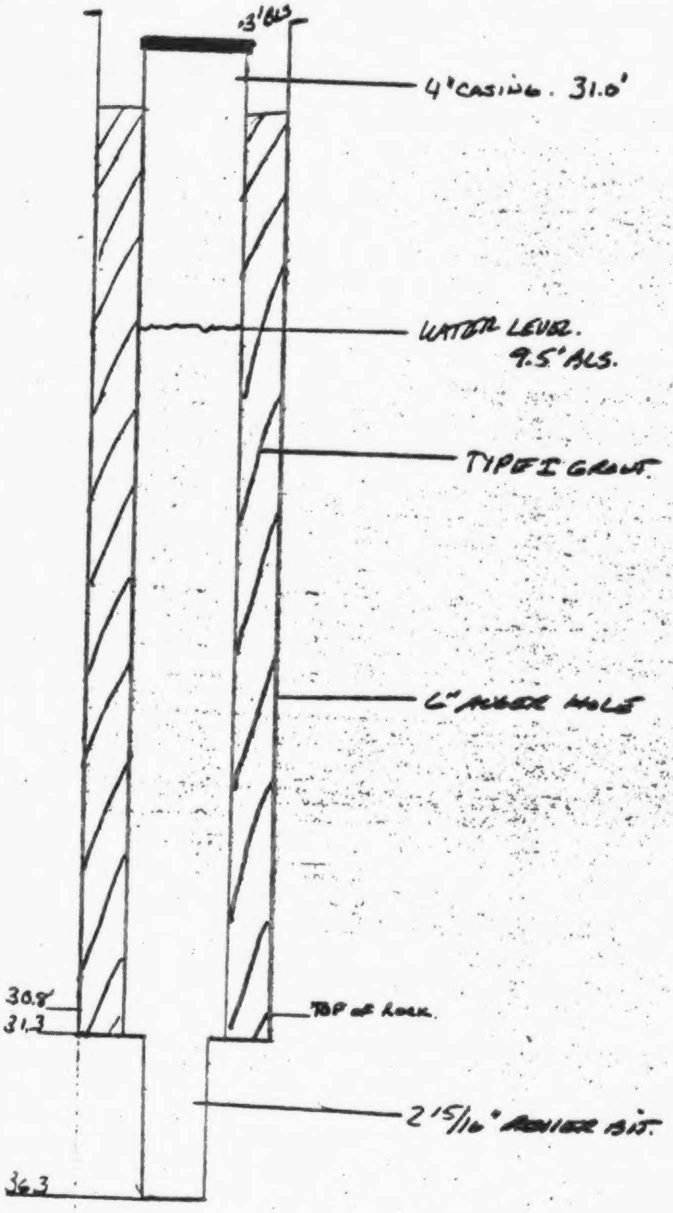
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Water in hole from 27' down as augering

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist Ed Tokarski

Well No. 55-B

Project Love Canal

Location 629 102nd St.

Prepared By: Ed Tokarski

Scale: 1"=5'

Date 9/27/80

WELL LOG

PROFILE	DESCRIPTION
LAND SURFACE	
Topsoil	DARK BROWN loam to silty loam
DARK GREY clayey silt	DARK GREY TO BLACK SAND AND silt with some clay
5 Brown clayey silt	yellow brown and grey clayey silt with stringers of black silt
Reddish brown silty clay 10 15 20	Mixture of medium brown clayey silt and reddish brown clay at the top of the unit grading into a reddish brown silty clay towards the middle
Till	Reddish brown till with small, rounded pebbles in matrix of silty clay. Soft at the top of the unit but hard within 2 feet of the contact.

PROJECT Love Canal

OWNER N.Y.S. Dept. of Transportation

WELL NO. 56-A

LOCATION on Frontier Ave. south of Love Canal

	Date	Time
DRILLING STARTED	9/30/80	0945
DRILLING COMPLETED	9/30/80	1230

DRILLER Joe Jensen

GEOLOGIST Charlie Kufs

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet measured

TOPO POSITION flat lying lacustrian plain

PROFILE BY C. Kufs

FIELD BOOK NO. 3 PAGES 72

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 23' BLS

CASING DIAMETER 2"

CASING LENGTH 23'

SCREEN DIAMETER 2"

SCREEN SETTING 19' BLS - 21' BLS

SCREEN SLOT/TYPE 10 slot/SS .001 stainless

PUMP TEST DATA

STATIC DEPTH TO WATER not yet measured

DATE MEASURED

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

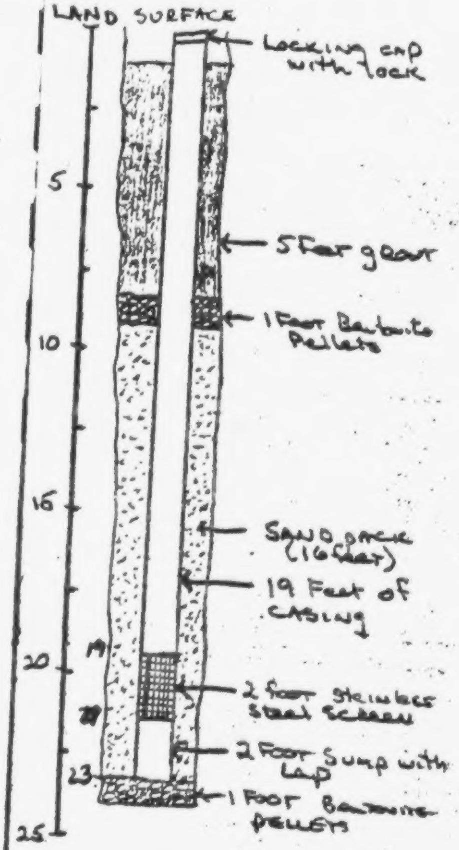
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

56A

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

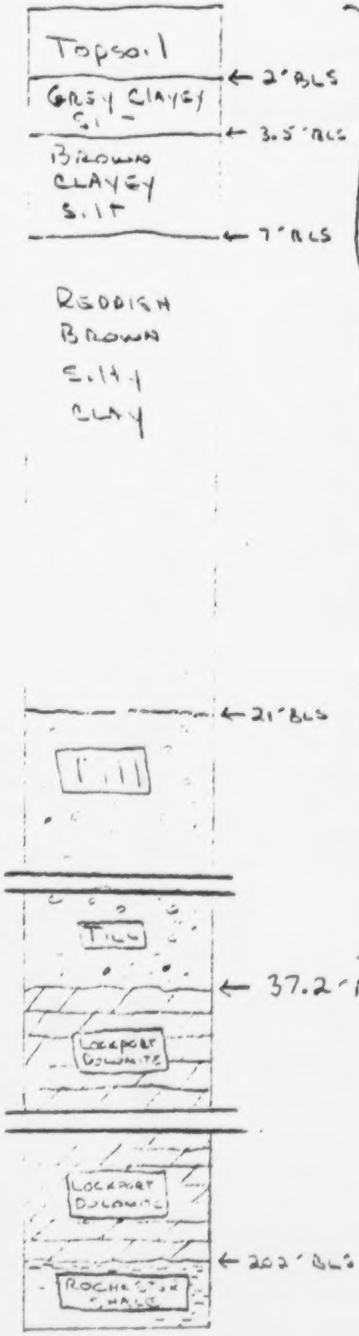
Rig Type CME-55
Driller Joe Jensen
Supervisory Geologist Charlie Kufs

Well No. 56-A
Project Love Canal
Location on Frontier Ave. south of Love Canal
Date 9/30/80

Prepared By: C. Kufs
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



See Well Log for Well 56A and Soil Evaluation Report for a detailed description of the Overburden

See Core Log for Description of Bedrock

PROJECT Love Canal
OWNER New York Dept. of Transportation
WELL NO. 56-B/C
LOCATION on Frontier St. just south of Love Canal

	Date	Time
DRILLING STARTED	9/29/80	1155
DRILLING COMPLETED	10/6/80	1100

DRILLER Joe Jensen
GEOLOGIST Charlie Kufs
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION ~~not yet measured~~ 574.9
TOPO POSITION flat lying lacustrian plain
PROFILE BY Charlie Kufs
FIELD BOOK NO. 3 PAGES 70-102

WELL DATA

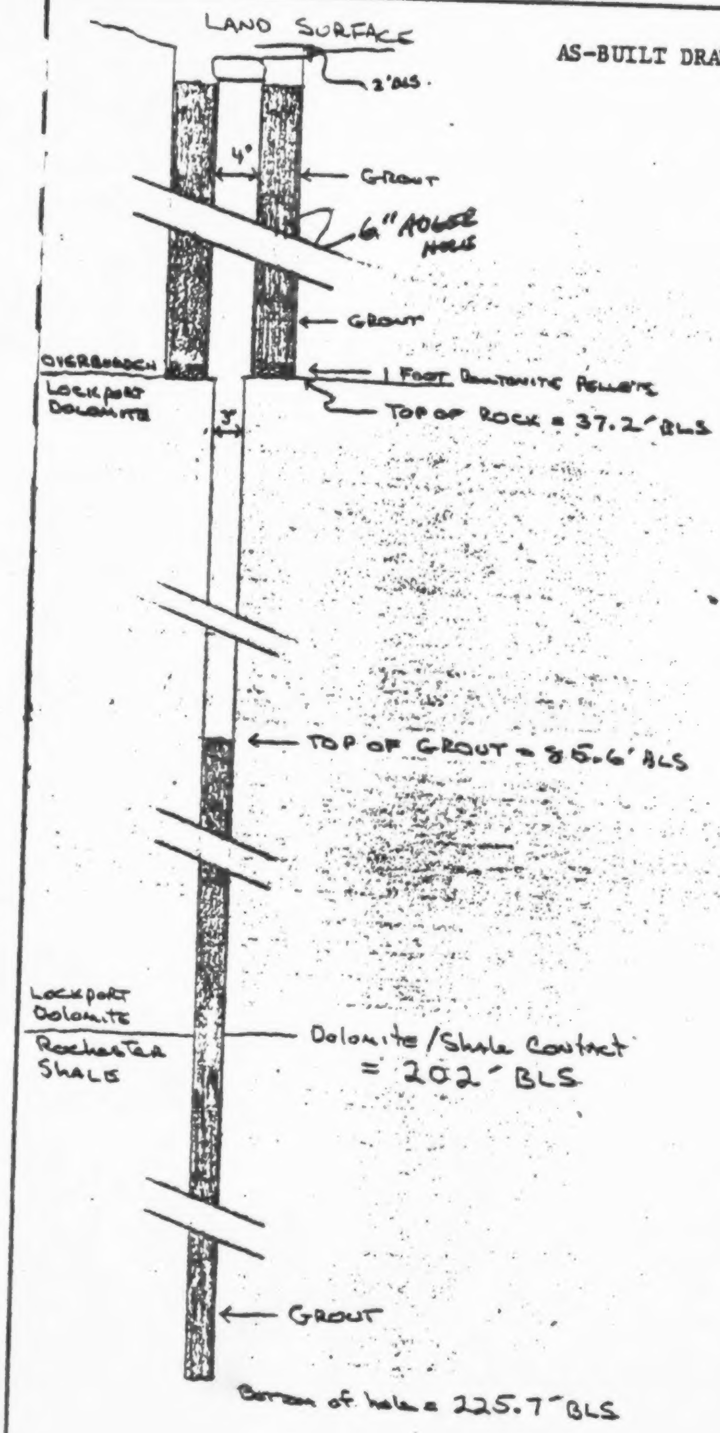
HOLE DIAMETER 4" to bedrock, 2 15/16 into rock
HOLE DEPTH 225.7'
CASING DIAMETER 4"
CASING LENGTH 37'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
DEPTH TO BEDROCK 37.2'

PUMP TEST DATA

STATIC DEPTH TO WATER 9.80' BLS
DATE MEASURED 10/5/80 @ 0756
PUMPING DEPTH TO WATER 19.34' at end of pumping
TEST DURATION 8.5 hrs. pumping/1 hr recovery
PUMPING RATE 10 GPM
TEST DATE 10/5/80
TEST TYPE Drawdown/Recovery
PUMP SETTING land surface
SPECIFIC CAPACITY not yet calculated

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Joe Jensen

Supervisory Geologist Charlie Kufs

Well No. 56-B/Ⓒ

Project Love Canal

Location on Frontier St. just south of Love Canal

Date 9/6/80

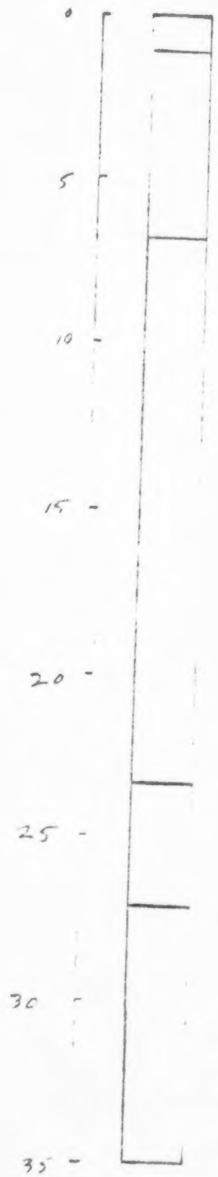
Prepared By: Charlie Kufs

Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



Brown clayey topsoil

Lighter brown clay

Reddish brown clay

Till

Bedrock

PROJECT Love Canal
OWNER Joseph Baio
WELL NO. 63-B
LOCATION 11 S. Mason Ct.

	Date	Time
DRILLING STARTED	10/8/80	0855
DRILLING COMPLETED	10/11/80	1400

DRILLER Ron Bush
GEOLOGIST Tom Farmer
RIG TYPE CME-55
REFERENCE POINT ground surface
R.P. ELEVATION not yet surveyed 572.9
TOPO POSITION flat
PROFILE BY Tom Farmer
FIELD BOOK NO. 11 PAGES 43, 49-50

WELL DATA

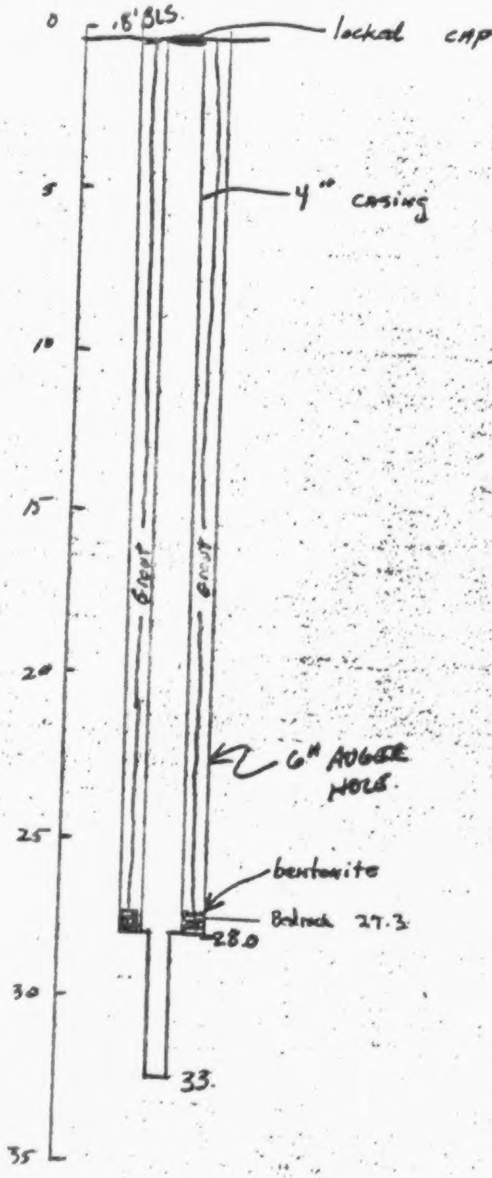
HOLE DIAMETER 6" - 2 15/16
HOLE DEPTH 33' - Total
CASING DIAMETER 4"
CASING LENGTH 27.2'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
DEPTH TO BEDROCK 27.3'

PUMP TEST DATA

STATIC DEPTH TO WATER 7.9'
DATE MEASURED 10/11/80
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation

Casing Height Above L-S

Total Depth

Borehole Diameter

Casing Diameter

Casing Thickness

Casing Lengths

Screen Data
- Material
- Diameter
- Slot Openings
- Settings

Centralizers

Grout Type

Gravel Pack

K-Fittings

Packers

Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Tom Farmer

Well No. 63-B

Project Love Canal

Location 11 S. Mason Ct.

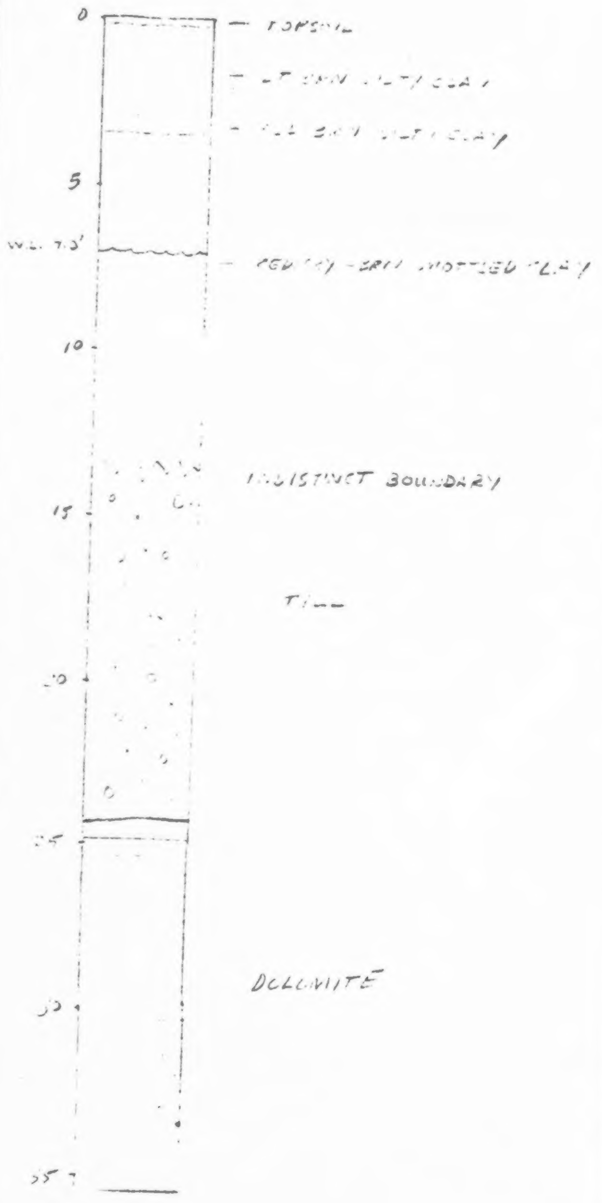
Prepared By: Tom Farmer

Scale: 1"=5'

Date 10/11/80

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER Harland Holmes

WELL NO. 64-B

LOCATION 1087 99th St.

	Date	Time
DRILLING STARTED	10/8/80	0937
DRILLING COMPLETED	10/11/80	1011

DRILLER Roger Logel

GEOLOGIST Dave Conover

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 572.2

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 76,77,82

WELL DATA

HOLE DIAMETER 6", 3"

HOLE DEPTH 35.5' - Total

CASING DIAMETER 4"

CASING LENGTH 24.8'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 24.3'

PUMP TEST DATA

STATIC DEPTH TO WATER 7.0'

DATE MEASURED 10/11/80 @ 1021

PUMPING DEPTH TO WATER not pumped

TEST DURATION

PUMPING RATE

TEST DATE

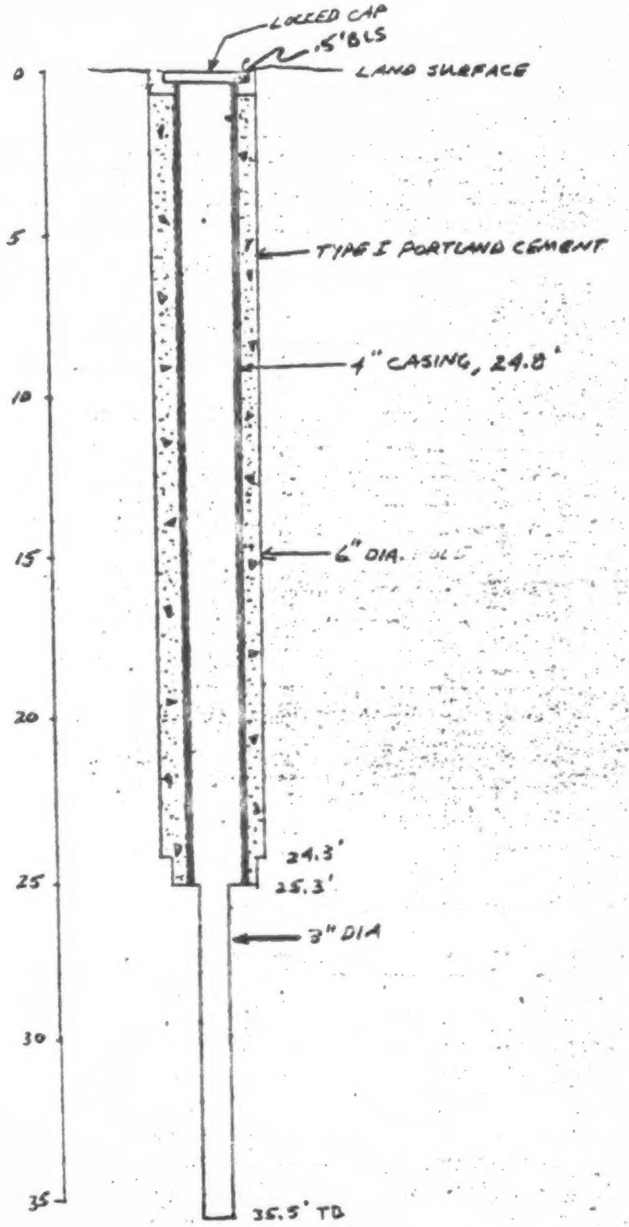
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C
Driller Roger Logel
Supervisory Geologist Dave Conover

Well No. 64-B
Project Love Canal
Location 1087 99th St.

Prepared By: Dave Conover
Scale: 1"=5'

Date 10/11/80

WELL LOG

PROFILE	DESCRIPTION
0	LANDSURFACE
	DARK BROWN SILT LOAM
1'	
	BROWN SILT LOAM
3'	
	REDDISH BROWN SILT LOAM
6'	
	BROWN SILTY CLAY
7'	
	REDDISH BROWN SILTY CLAY
10.5'	
	BOULDER
12.0'	
	REDDISH BROWN SILTY CLAY
14.6'	
	SOFT TILL
17.0'	
	HARD TILL
25.2'	
	BOULDER
25.7	
	DOLOMITE

PROJECT Love Canal

OWNER William Prandy

WELL NO. 65-B

LOCATION 1037 101st St. - front yard

	Date	Time
DRILLING STARTED	9/25/80	1300
DRILLING COMPLETED	9/27/80	1000

DRILLER Mike Warner

GEOLOGIST Alfred Wickline

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 572.5

TOPO POSITION flat lying

PROFILE BY Alfred Wickline

FIELD BOOK NO. 6 PAGES 73-77, 79

WELL DATA

HOLE DIAMETER 6"- 2 15/16

HOLE DEPTH 38.2 Total

CASING DIAMETER 4"

CASING LENGTH 26'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 25.8'

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/26/80 @ 0900

PUMPING DEPTH TO WATER N/A

TEST DURATION N/A

PUMPING RATE N/A

TEST DATE N/A

TEST TYPE N/A

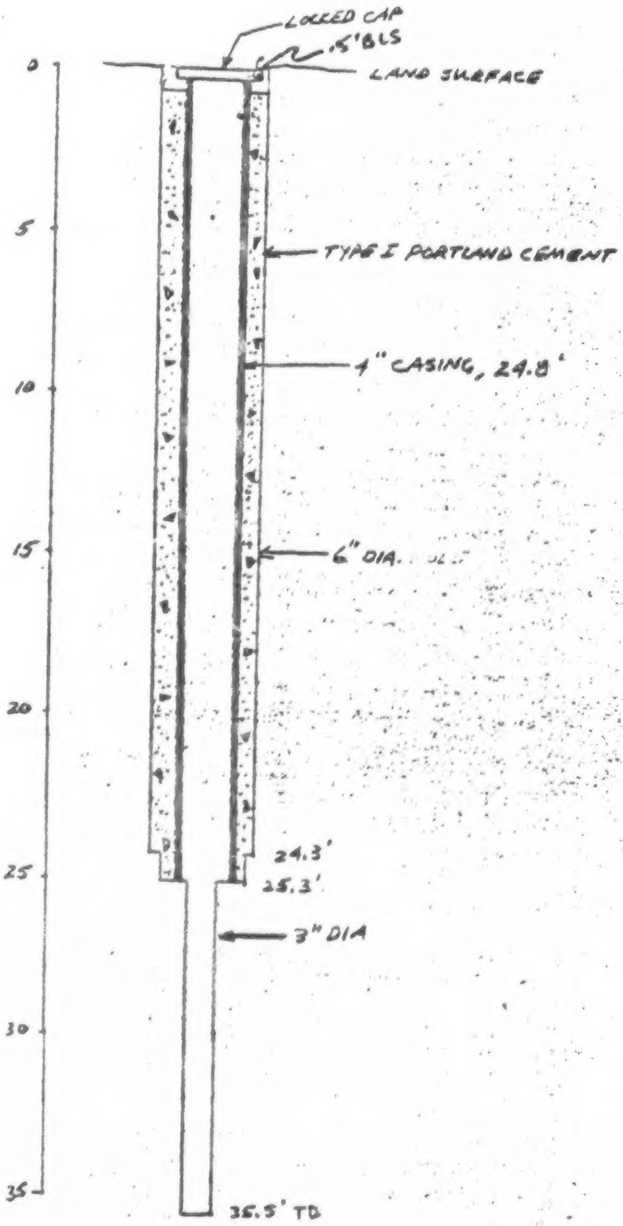
PUMP SETTING N/A

SPECIFIC CAPACITY N/A

REMARKS

Hit boulder just above bedrock
Triconed .5' into bedrock for socket for 4" casing

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
    - Material
    - Diameter
    - Slot Openings
    - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C
Driller Roger Logel
Supervisory Geologist Dave Conover

Well No. 64-B
Project Love Canal
Location 1087 99th St.

Date 10/11/80

Prepared By: Dave Conover
Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
0	LANDSURFACE
	DARK BROWN SILT LOAM
1'	
	BROWN SILT LOAM
3'	
	REDDISH BROWN SILT LOAM
6'	
	BROWN SILTY CLAY
7'	
	REDDISH BROWN SILTY CLAY
10.5'	
	BOULDER
12.0'	
	REDDISH BROWN SILTY CLAY
14.5'	
	SOFT TILL
17.0'	
	HARD TILL
25.2'	
	BOULDER
25.7	
	DOLOMITE

PROJECT Love Canal
OWNER William Prandy
WELL NO. 65-B
LOCATION 1037 101st St. - front yard

	Date	Time
DRILLING STARTED	9/25/80	1300
DRILLING COMPLETED	9/27/80	1000

DRILLER Mike Warner
GEOLOGIST Alfred Wickline
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION not surveyed 572.5
TOPO POSITION flat lying
PROFILE BY Alfred Wickline
FIELD BOOK NO. 6 PAGES 73-77, 79

WELL DATA

HOLE DIAMETER 6"- 2 15/16
HOLE DEPTH 38.2 Total
CASING DIAMETER 4"
CASING LENGTH 26'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
DEPTH TO BEDROCK 25.8'

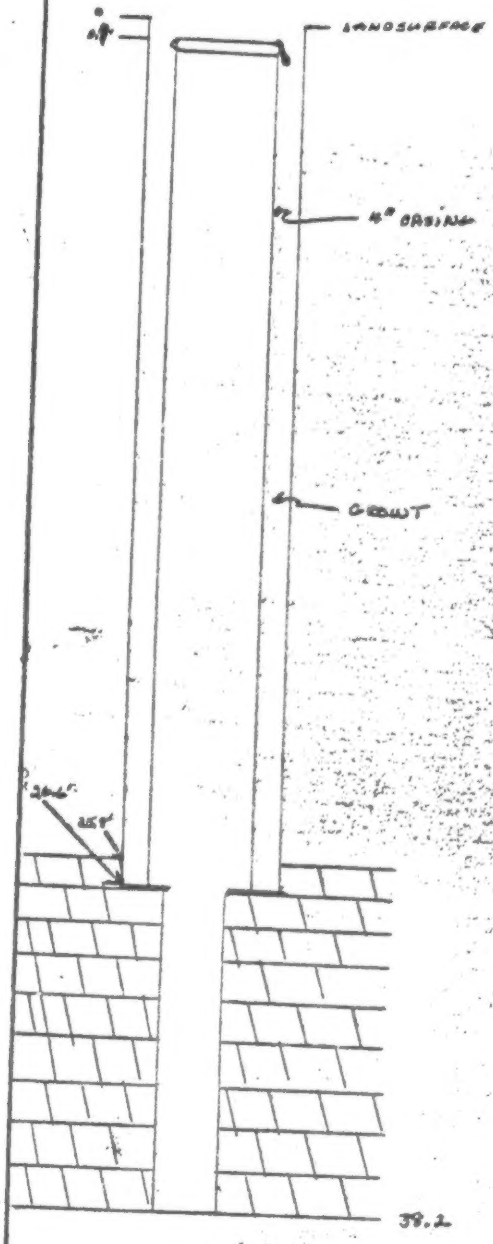
PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 9/26/80 @ 0900
PUMPING DEPTH TO WATER N/A
TEST DURATION N/A
PUMPING RATE N/A
TEST DATE N/A
TEST TYPE N/A
PUMP SETTING N/A
SPECIFIC CAPACITY N/A

REMARKS

Hit boulder just above bedrock
Triconed .5' into bedrock for socket for
4" casing

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Alfred Wickline

Well No. 65-B ,

Project Love Canal

Location 1037 101st St. - front yard

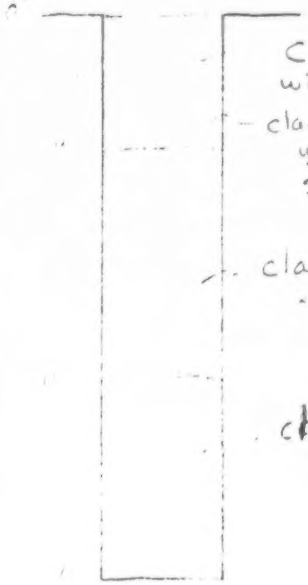
Date 9/27/80

Prepared By: Alfred Wickline

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



Clay - dark brown with topsoil

clay - light brown with yellow to yellow brown silty sand

clay - light brown slightly moist

clay - light brown moist to wet

PROJECT Love Canal

OWNER Dina M. Bouley

WELL NO. 66-A

LOCATION 10002 Wheatfield

	Date	Time
DRILLING STARTED	9/30/80	1522
DRILLING COMPLETED	9/30/80	1536

DRILLER Ed Cole

GEOLOGIST David Robertson

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 574.9

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 5 PAGES 71-72

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 17'

CASING DIAMETER 2"

CASING LENGTH 16.5'

SCREEN DIAMETER 2"

SCREEN SETTING 15'-13'

SCREEN SLOT/TYPE .0001/ Stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/30/80 @ 4:45

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

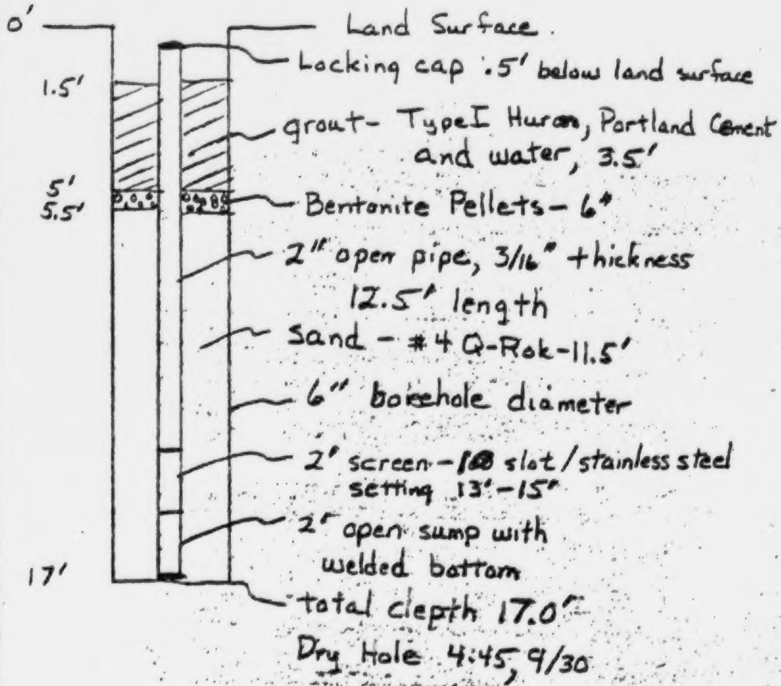
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

AS-BUILT DRAWING


0'
1.5'
5'
5.5'
17'
Land Surface
Locking cap .5' below land surface
grout- Type I Huron, Portland Cement and water, 3.5'
Bentonite Pellets- 6"
2" open pipe, 3/16" thickness 12.5' length
Sand - #4 Q-Rok-11.5'
6" borehole diameter
2' screen-10 slot/stainless steel setting 13'-15'
2' open sump with welded bottom
total depth 17.0'
Dry Hole 4:45, 9/30

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
    - Material
    - Diameter
    - Slot Openings
    - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 66-A

Project Love Canal

Location 10002 Wheatfield

Prepared By: David Robertson

Scale: 1"=5'

Date 9/30/80

WELL LOG

PROFILE

DESCRIPTION

Clay - dark brown with topsoil

Clay - light brown [illegible] with [illegible] sandy silt

Clay - light brown varying in moisture from slightly moist to wet with depth

[illegible]

[illegible]

PROJECT Love Canal
OWNER Dina M. Bouley
WELL NO. 66-B
LOCATION 10002 Wheatfield

	Date	Time
DRILLING STARTED	9/29/80	0906
DRILLING COMPLETED	10/3/80	1316

DRILLER Ed Cole
GEOLOGIST David Robertson
RIG TYPE Acker AD-2
REFERENCE POINT ground level
R.P. ELEVATION not yet surveyed 574.9
TOPO POSITION flat lying
PROFILE BY David Robertson
FIELD BOOK NO. 5 PAGES 65-72,83-85

WELL DATA

HOLE DIAMETER 6" - 2 15/16"
HOLE DEPTH 34.5' - 40.0'
CASING DIAMETER 4"
CASING LENGTH 34.2'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
Depth to Bedrock 33.7'

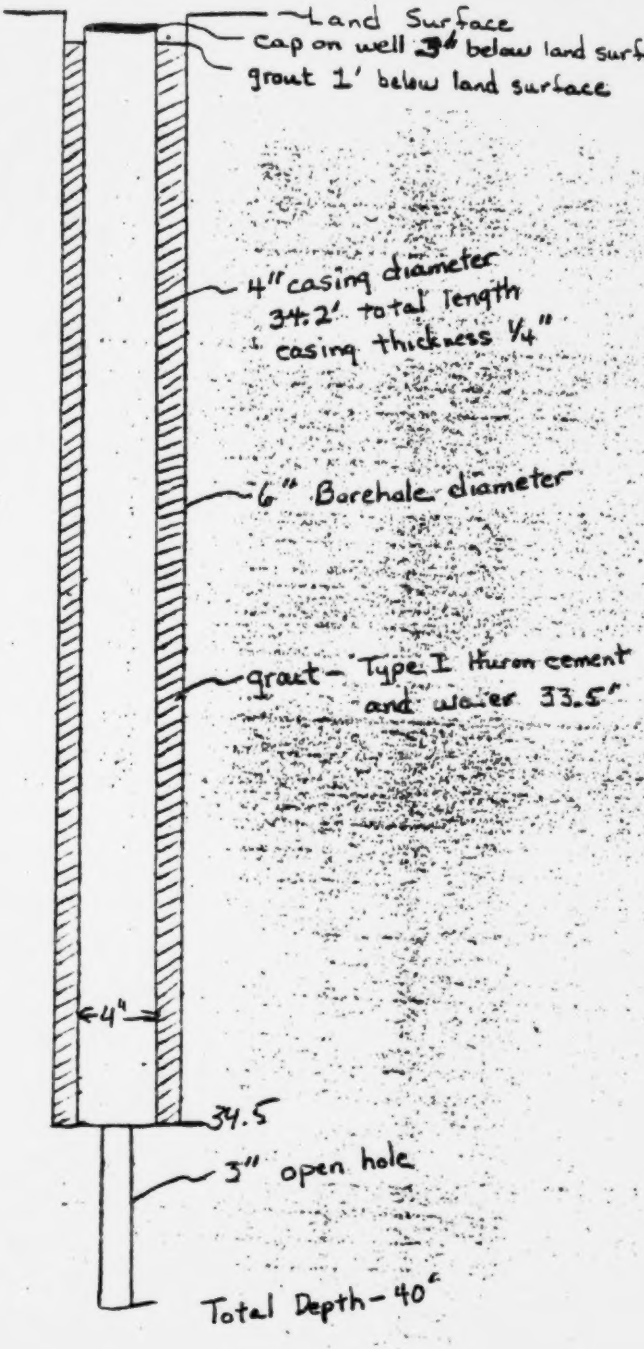
PUMP TEST DATA

STATIC DEPTH TO WATER 13.5'
DATE MEASURED 10/3/80 @ 1427
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Finished well with locking cap
Purged 10/3/80

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 66-B

Project Love Canal

Location 10002 Wheatfield

Prepared By: David Robertson

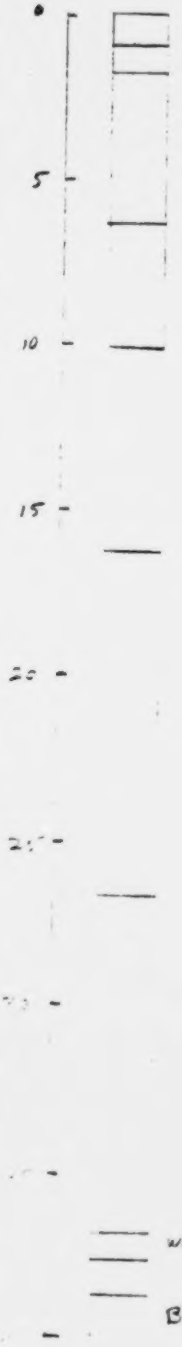
Scale: 1"=5'

Date 9/30/80

WELL LOG

PROFILE

DESCRIPTION



dark brown topsoil
brown clay
light brown clay

reddish brown silty clay

reddish brown clay

sticky gray clay

Till

water producing zone

Bedrock

PROJECT Love Canal
OWNER Mrs. Gower
WELL NO. 67-A
LOCATION 450 101st St.

	Date	Time
DRILLING STARTED	9/27/80	1040
DRILLING COMPLETED	9/27/80	1355

DRILLER Ron Bush
GEOLOGIST Tom Farmer
RIG TYPE CME-55
REFERENCE POINT ground surface
R.P. ELEVATION not surveyed 574.3
TOPO POSITION not surveyed
PROFILE BY Tom Farmer
FIELD BOOK NO. 11 PAGES 12-15

WELL DATA

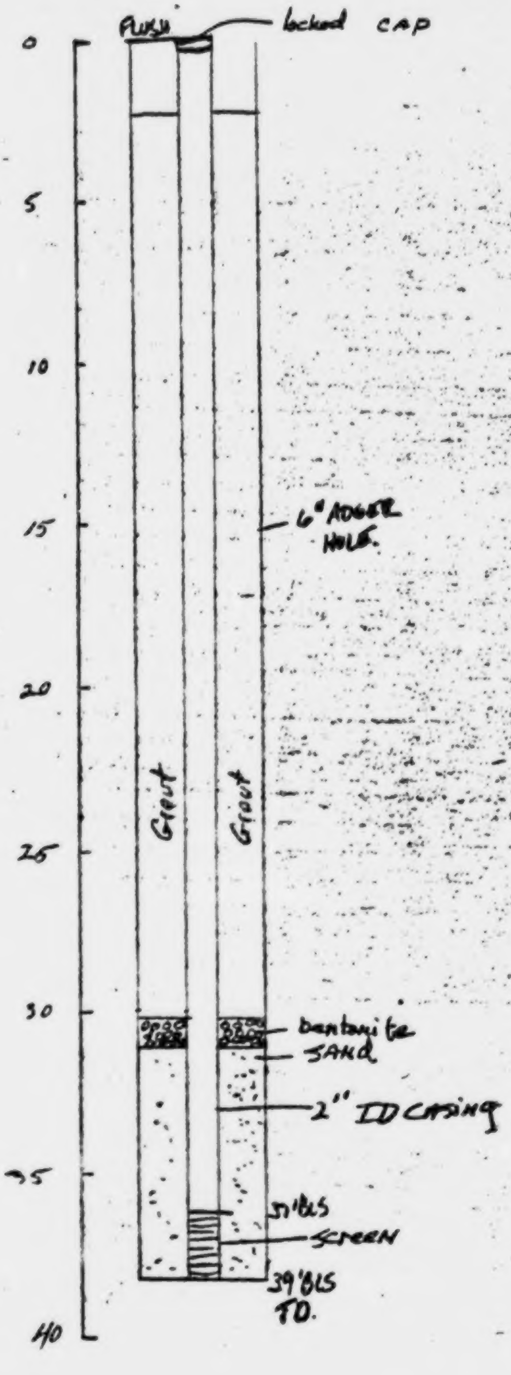
HOLE DIAMETER 6"
HOLE DEPTH 39'
CASING DIAMETER 2"ID
CASING LENGTH 39'
SCREEN DIAMETER 2"
SCREEN SETTING 39'-37'
SCREEN SLOT/TYPE .0001" Stainless

PUMP TEST DATA

STATIC DEPTH TO WATER 14.3'
DATE MEASURED 9/27/80
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Tom Farmer

Well No. 67-A
Project Love Canal
Location 450 101st St.

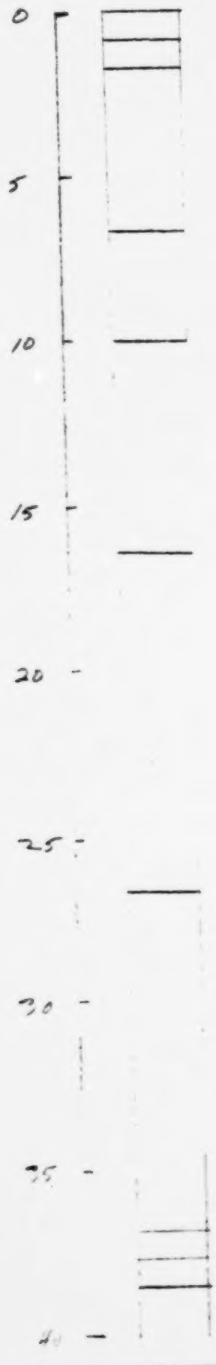
Prepared By: Tom Farmer
Scale: 1"-5'

Date 9/27/80

WELL LOG

PROFILE

DESCRIPTION



dark brown topsoil

brown clay

light brown clay

reddish brown silty clay

reddish brown clay

sticky gray clay

Till

Water producing zone 37'

39'

Bedrock

PROJECT Love Canal

OWNER Mrs. Gower

WELL NO. 67-B

LOCATION 450 101st St.

	Date	Time
DRILLING STARTED	9/26/80	0910
DRILLING COMPLETED	9/29/80	1100

DRILLER Ron Bush

GEOLOGIST Tom Farmer

RIG TYPE CME-55

REFERENCE POINT ground surface

R.P. ELEVATION not surveyed 574.3'

TOPO POSITION not surveyed

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 PAGES 12-15, 16

WELL DATA

HOLE DIAMETER 6" - 2 15/16

HOLE DEPTH 44.7' - Total

CASING DIAMETER 4"

CASING LENGTH 39.6'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 39'

PUMP TEST DATA

STATIC DEPTH TO WATER 2.85'; 8.99'

DATE MEASURED 9/27/80; 9/29/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

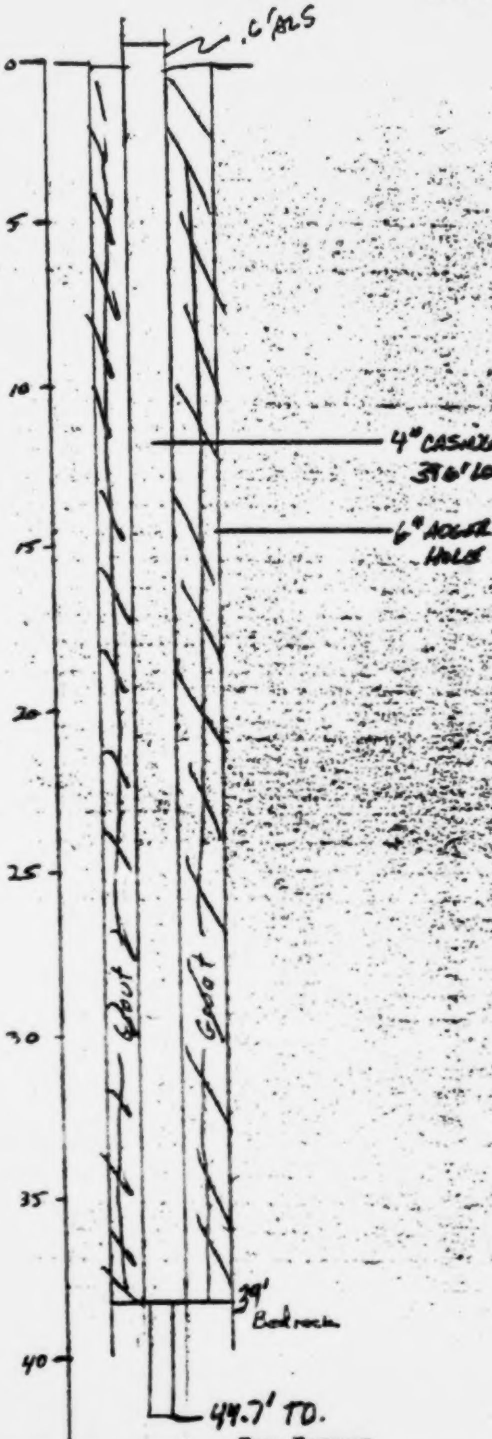
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Tom Farmer

Well No. 67-B

Project Love Canal

Location 450 101st St.

Prepared By: Tom Farmer

Scale: 1"=5'

Date 9/27/80

WELL LOG

PROFILE	DESCRIPTION
0	
	BLACK TOP SOIL, CINDERS, ASH GRAVEL
2'	
	YELLOW BROWN SILTY CLAY
4'	
	YELLOW GRAY BROWN SANDY SILT
5.5'	
	REDDISH BROWN SILTY CLAY
7.5'	
	REDDISH GRAY BROWN SILTY CLAY YELLOW BROWN SILT VARVES
9'	
	REDDISH GRAY CLAY WET, PLASTIC, PASTE
14.5'	
	REDDISH BROWN TILL WITH PEBBLES AND QUARTZITE BOULDER
15.2'	

PROJECT Love Canal

OWNER Lois Rowe

WELL NO. 68-A

LOCATION 489 100th St. in front of garage

	Date	Time
DRILLING STARTED	9/25/80	0720
DRILLING COMPLETED	9/25/80	1700

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 574.6

TOPO POSITION flat

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 79-80

WELL DATA

HOLE DIAMETER 6.5" auger

HOLE DEPTH 15.2'

CASING DIAMETER 2"

CASING LENGTH 14.5'

SCREEN DIAMETER 2"

SCREEN SETTING 14'-12' BLS

SCREEN SLOT/TYPE .001" SS

PUMP TEST DATA

STATIC DEPTH TO WATER 14'

DATE MEASURED 9/25/80 @ 1640

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

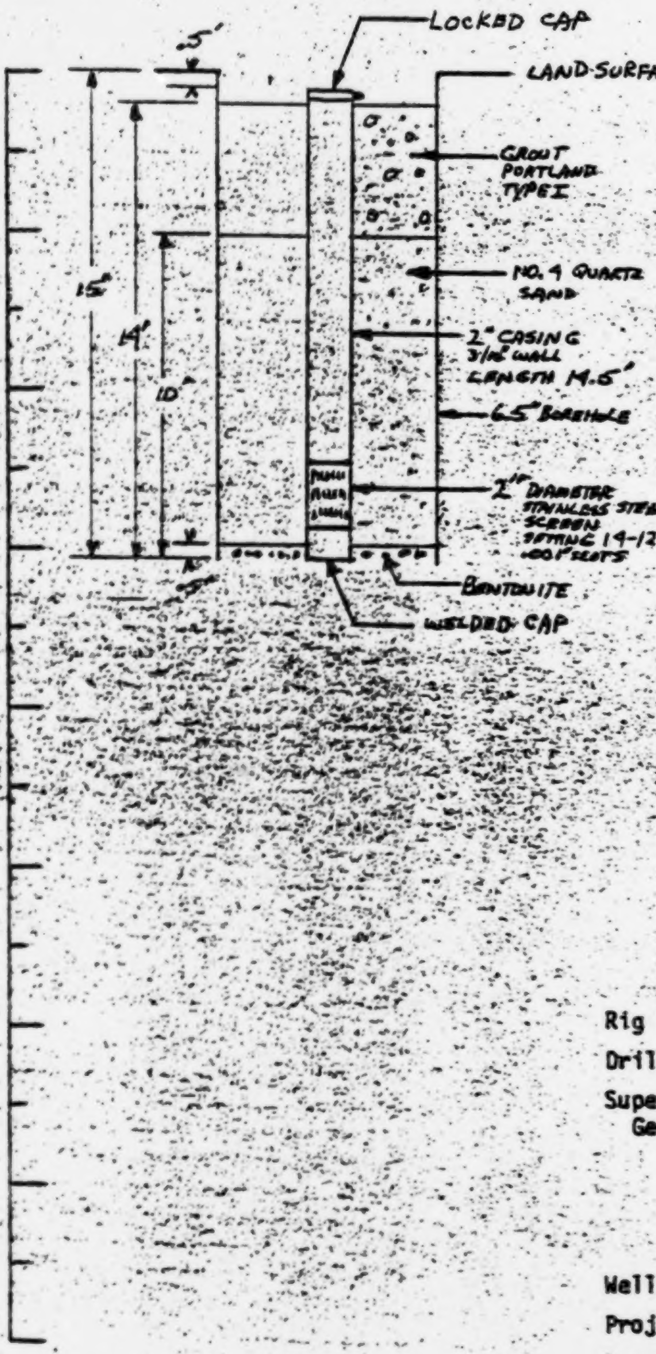
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist Dennis Stanczuk

Well No. 68-A

Project Love Canal

Location 489 100th St. in front of garage

Prepared By: Dennis Stanczuk

Scale: 1"=5'

Date 9/25/80

WELL LOG

PROFILE	DESCRIPTION
0	BLACK TOP SOIL, CINDERS, ASH GRAVEL
2'	YELLOW BROWN SILTY CLAY MOIST
3.5'	YELLOWISH GRAY BROWN SANDY SILT
5'	REDDISH BROWN SILTY CLAY
9'	REDDISH GRAY BROWN CLAY PLASTIC PASTE
14.2'	REDDISH BROWN TILL WITH PEBBLES AND GRAVEL
	SAND AND PEBBLES-GRADED TOP TO BOTTOM
38'	DOLOMITE
43.3	Total Depth

PROJECT Love Canal

OWNER Lois Rowe

WELL NO. 68-B

LOCATION 489 100th St. in front of garage

	Date	Time
DRILLING STARTED	9/25/80	0925
DRILLING COMPLETED	10/1/80	0904

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 574.6

TOPO POSITION flat lying

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2, 5 PAGES 81-84, 73-74

WELL DATA

HOLE DIAMETER 6.5" auger - 2 15/16 tricone

HOLE DEPTH 39' - 43.3'

CASING DIAMETER 4"

CASING LENGTH 39'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 38'

PUMP TEST DATA

STATIC DEPTH TO WATER 9.3'

DATE MEASURED 10/1/80 @ 0929

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

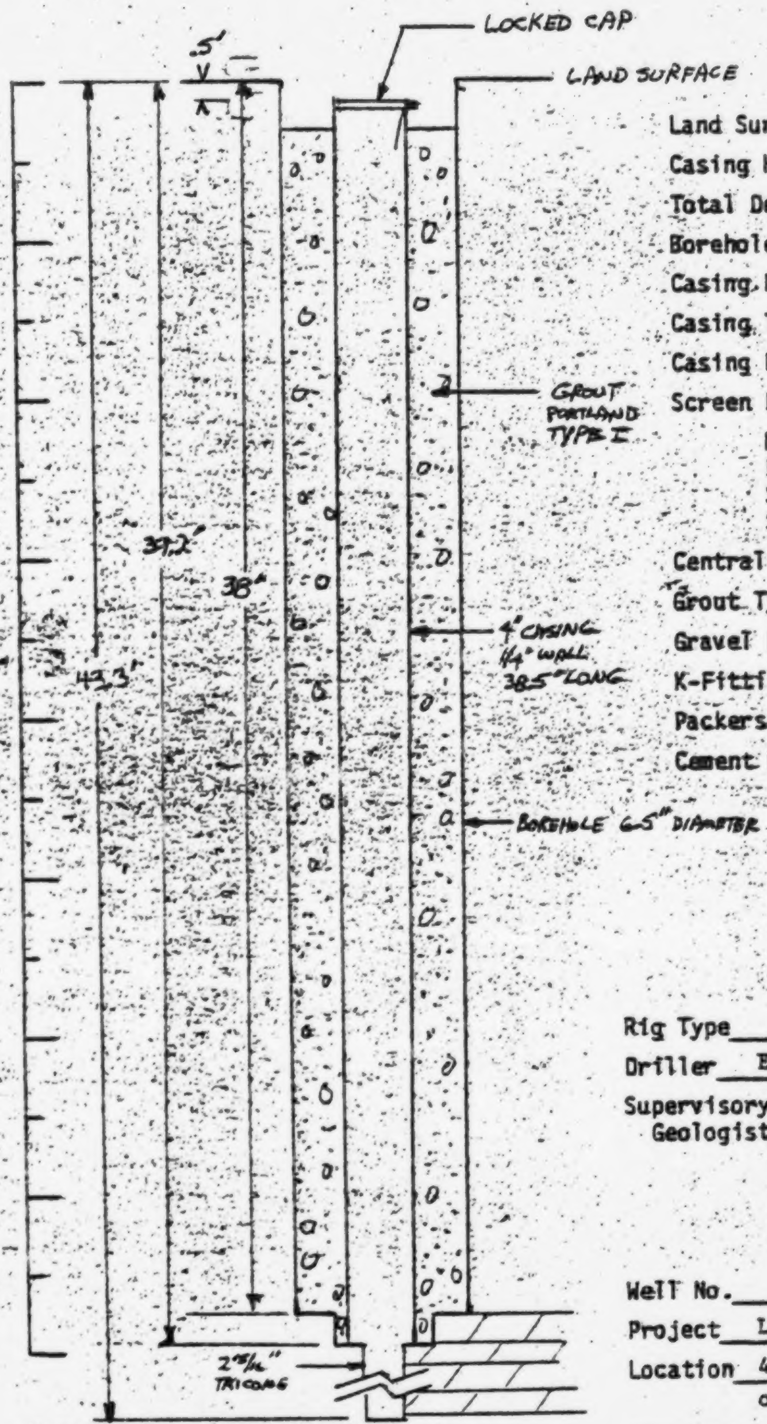
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Seitings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist Dennis Stanczuk

Well No. 68-B

Project Love Canal

Location 489 100th St. - in front of garage

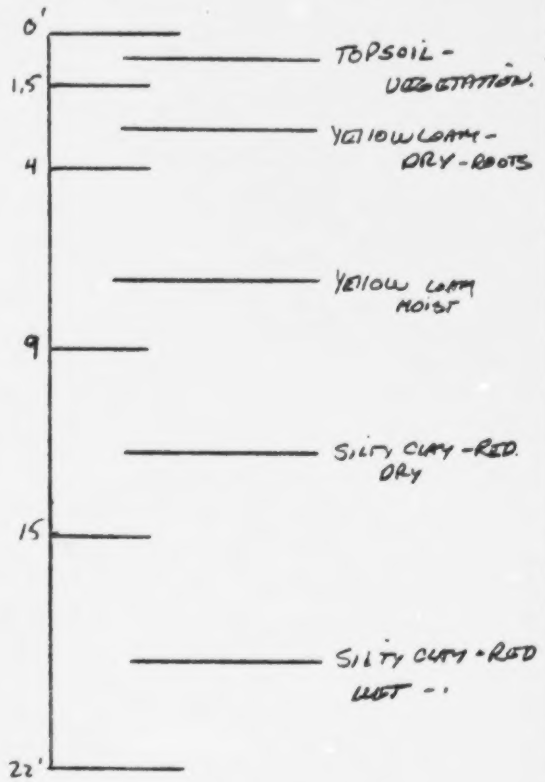
Date 9/26/80

Prepared By: Dennis Stanczuk

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER State of New York

WELL NO. 71-A

LOCATION 385 99th St.

	Date	Time
DRILLING STARTED	9/30/80	1600
DRILLING COMPLETED	9/30/80	1715

DRILLER Roger Logel

GEOLOGIST Ed Tokarski

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 5751

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES 43

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 22'

CASING DIAMETER 2"

CASING LENGTH 21.3'

SCREEN DIAMETER 2"

SCREEN SETTING 18' - 20'

SCREEN SLOT/TYPE .0001 stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/30/80 @ 1715

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

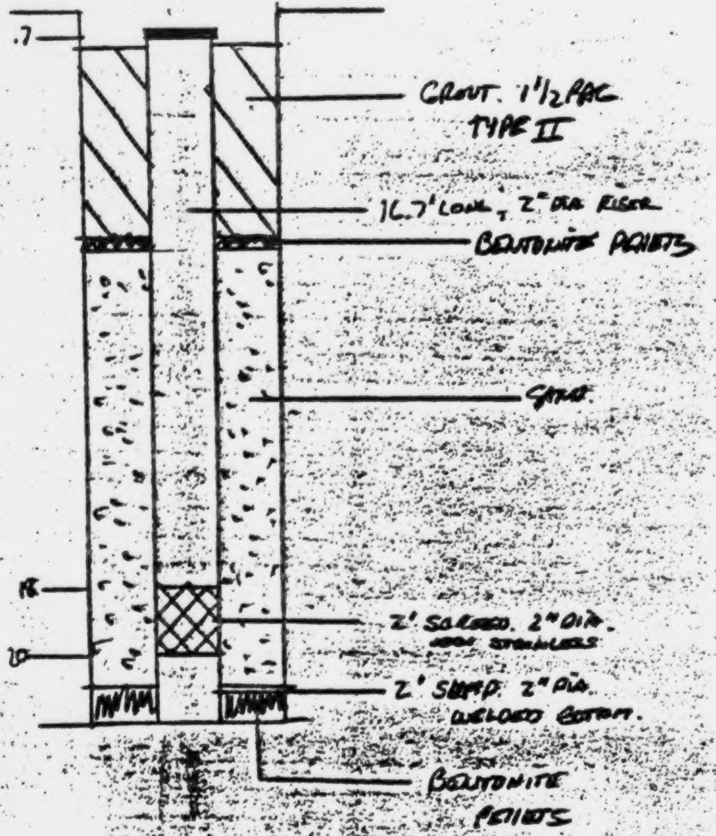
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist Ed Tokarski

Well No. 71-A

Project Love Canal

Location 385 99th St.

Prepared By: Ed Tokarski

Scale: 1"=5'

Date 9/30/80

WELL LOG

PROFILE **DESCRIPTION**

TOPSOIL - VEGETATION.
1.5
YELLOW LOAM - DRY.
4
YELLOW LOAM w/ ROOTS. - MOIST
6
6.5
YELLOW LOAM w/ ROOTS - DRY
SILTY CLAY - RED DRY.
8
8.5
SANDY CLAY - RED - WHITE - DRY.
SILTY CLAY - RED DRY - GREY MOTTLING
14
SILTY CLAY - RED MOIST - GREY MOTTLING
16
SILTY CLAY - RED WET - GREY MOTTLING.
22
SILTY CLAY - RED VERY WET.
23
TILL - DOLOMITE PEBBLES IN RED MATRIX
40.5
BEDROCK - DOLOMITE.

PROJECT	Love Canal
OWNER	State of New York
WELL NO.	71-B
LOCATION	385 99th St.

	Date	Time
DRILLING STARTED	9/29/80	0735
DRILLING COMPLETED	10/4/80	1110

DRILLER	Roger Logel	
GEOLOGIST	Ed Tokarski	
RIG TYPE	CME-45C	
REFERENCE POINT	land surface	
R.P. ELEVATION	not surveyed	575.1'
TOPO POSITION	flat lying	
PROFILE BY	Ed Tokarski	
FIELD BOOK NO.	10	PAGES 38-43

WELL DATA

HOLE DIAMETER	6" - 2 15/16
HOLE DEPTH	45.3'
CASING DIAMETER	4"
CASING LENGTH	39.9' + 3' length
SCREEN DIAMETER	N/A
SCREEN SETTING	N/A
SCREEN SLOT/TYPE	N/A
DEPTH TO BEDROCK	40.5'

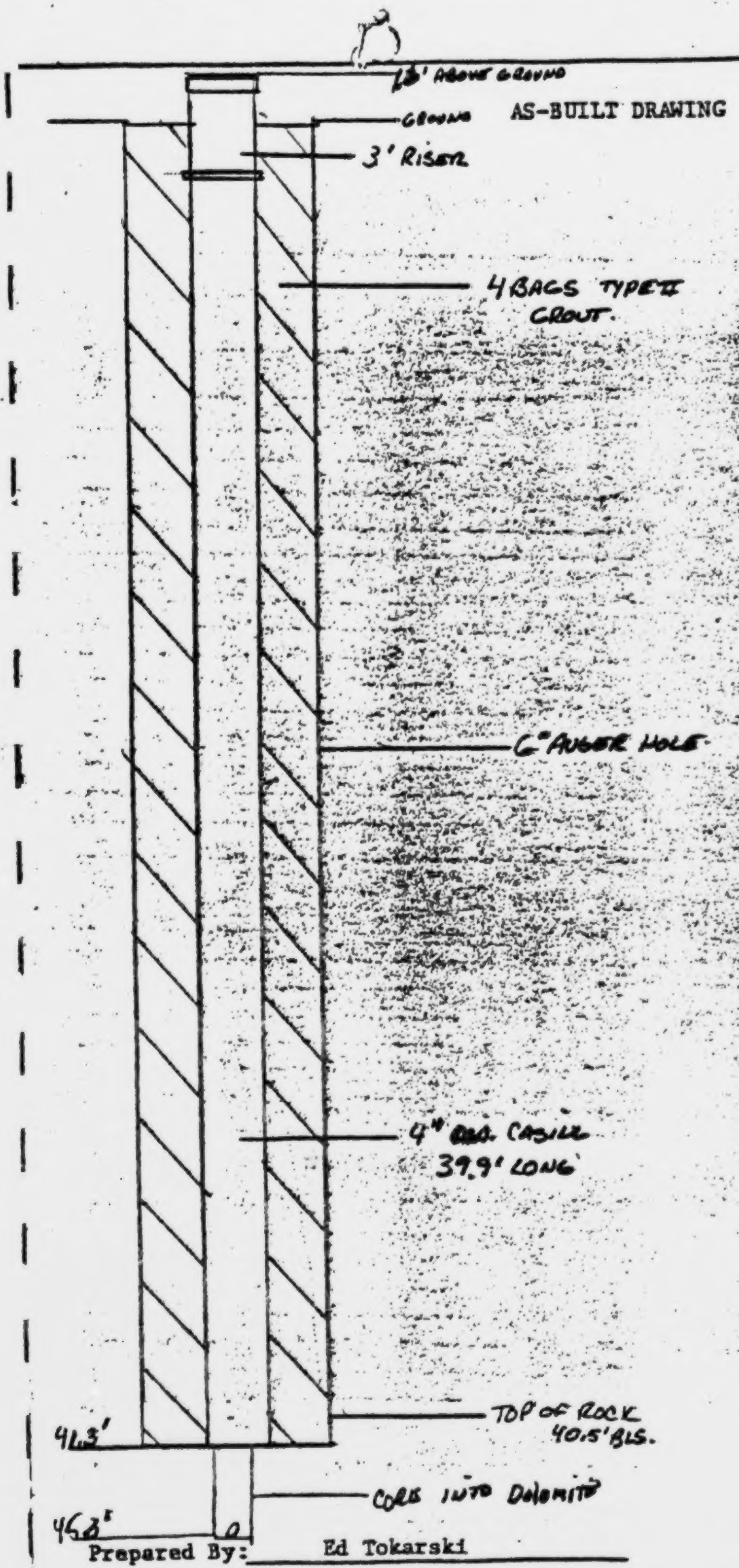
PUMP TEST DATA

STATIC DEPTH TO WATER	8.2' BLS
DATE MEASURED	9/30/80
PUMPING DEPTH TO WATER	
TEST DURATION	
PUMPING RATE	
TEST DATE	
TEST TYPE	
PUMP SETTING	
SPECIFIC CAPACITY	

REMARKS

Lead weight lost down hole while trying to measure draw down while purging. Pumped 30 gallons into hole. Removed approx. 950 gal. on 10/4/80

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
- Material
- Diameter
- Slot Openings
- Settings

Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C
Driller Roger Logel
Supervisory Geologist Ed Tokarski

Well No. 71-B
Project Love Canal
Location 385 99th St.

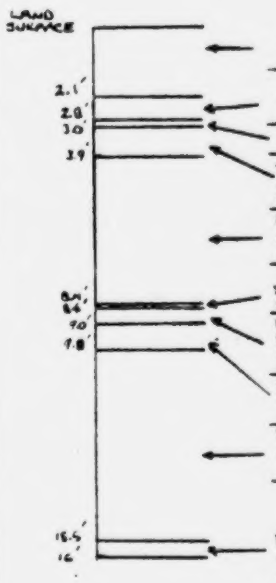
Date 9/30/80

Prepared By: Ed Tokarski
Scale: 1"=5'

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN SILTY CLAY COBBLY, FIRM, MOIST

REDDISH BROWN LOAMY FINE SAND, SOMEWHAT FIRM, MOIST

DARK BROWN FINE SANDY LOAM, SOMEWHAT PLASTIC, MOIST

YELLOWISH BROWN CLAY, VERY FIRM, SOMEWHAT MOIST, SOMEWHAT PLASTIC.

BROWN SILTY CLAY, VERY MOTTLED, VERY FIRM, SOMEWHAT MOIST

DARK BROWN SILTYCLAY, VERY MOIST.

DARK BROWN TO BROWN SILTY CLAY LOAM VERY FIRM, SOMEWHAT MOIST, MOTTLED.

DARK BROWN SILTY CLAY LOAM, VERY FIRM, MOIST, MOTTLED.

REDDISH BROWN SILTY CLAY VERY MOIST, PLASTIC, SOMEWHAT STICKY

REDDISH-BROWN SANDY CLAY VERY GRAVELLY, COBBLY, WET, PLASTIC, SOMEWHAT STICKY

SCALE: 1" = 5'

PROJECT Love Canal

OWNER State of New York

WELL NO. 72-A

LOCATION vacant lot north of 432 99th St.

	Date	Time
DRILLING STARTED	9/24/80	1450
DRILLING COMPLETED	9/24/80	1547

DRILLER Joe Genovese

GEOLOGIST Phil Spooner

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573.4

TOPO POSITION flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 38-39

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 16'

CASING DIAMETER 2"

CASING LENGTH 16.1'

SCREEN DIAMETER 2"

SCREEN SETTING 12.33'-14.33'

SCREEN SLOT/TYPE .001 Stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/24/80 @ 1547

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

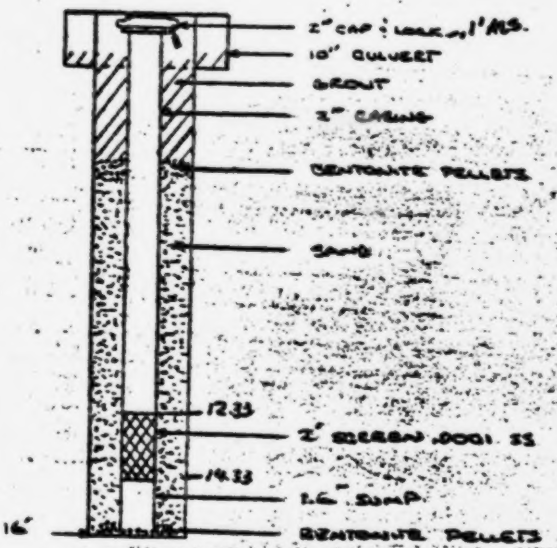
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Profile described from split spoon samples for well 72-C

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45
Driller Joe Genovese
Supervisory Geologist Phil Spooner

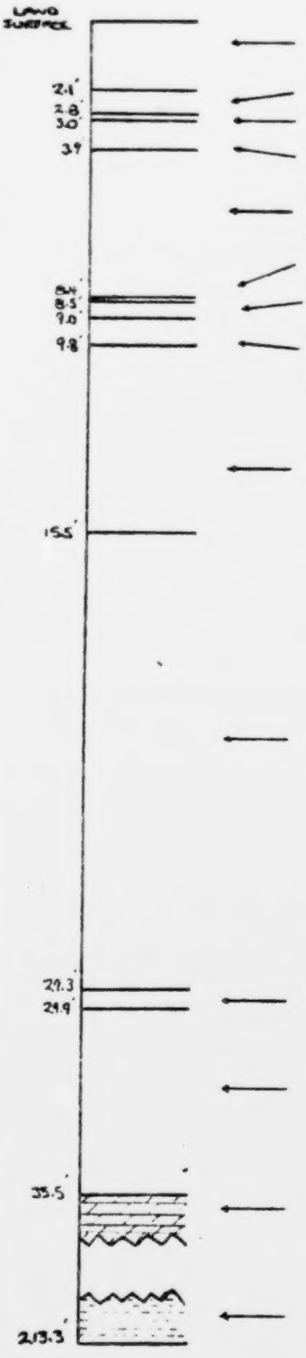
Well No. 72-A
Project Love Canal
Location vacant lot north of 432 99th St.

Date 9/24/80

Prepared By: Phil Spooner
Scale: 1"=5'

WELL LOG

PROFILE



DESCRIPTION

DARK RED SILTY CLAY, FIRM, MOIST, COBBLY

REDDISH BROWN LOAMY FINE SAND, SOMEWHAT FIRM, MOIST

DARK BROWN FINE SANDY LOAM SOMEWHAT PLASTIC, MOIST

YELLOWISH BROWN CLAY, VERY FIRM, SOMEWHAT PLASTIC, MOIST

BROWN SILTY CLAY, VERY MOTTLED, VERY FIRM, SOMEWHAT MOIST

DARK BROWN SILTY CLAY, VERY MOIST

DARK BROWN TO BROWN SILTY CLAY LOAM, VERY FIRM SOMEWHAT MOIST, MOTTLED

DARK BROWN SILTY CLAY LOAM, VERY FIRM, MOIST, MOTTLED

REDDISH BROWN SILTY CLAY, VERY MOIST, PLASTIC, SOMEWHAT STICKY

REDDISH BROWN SANDY CLAY VERY GRAVELLY, COBBLY, WET, PLASTIC, SOMEWHAT STICKY

DARK GRAYISH BROWN, SILTY CLAY, MOIST, FIRM

REDDISH BROWN, SILTY CLAY MOIST, FIRM

LOCKPORT DOLOMITE

SEE CORE LOG

ROCHESTER SHALE

SCALE: 1" = 5'

PROJECT Love Canal

OWNER State of New York

WELL NO. 72-B/C

LOCATION Vacant lot north of 432 99th St.

	Date	Time
DRILLING STARTED	9/23/80	1305
DRILLING COMPLETED	9/29/80	1620

DRILLER Joe Genovese

GEOLOGIST Phil Spooner/Dave Conover

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 573.9

TOPO POSITION flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 35-38,41-48

WELL DATA

HOLE DIAMETER 6" to 35.5', 3" to

HOLE DEPTH 213.3'

CASING DIAMETER 4"

CASING LENGTH 36.4'

SCREEN DIAMETER none

SCREEN SETTING

SCREEN SLOT/TYPE

DEPTH TO BEDROCK 35.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 8.47'

DATE MEASURED 9/29/80 @ 1620

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

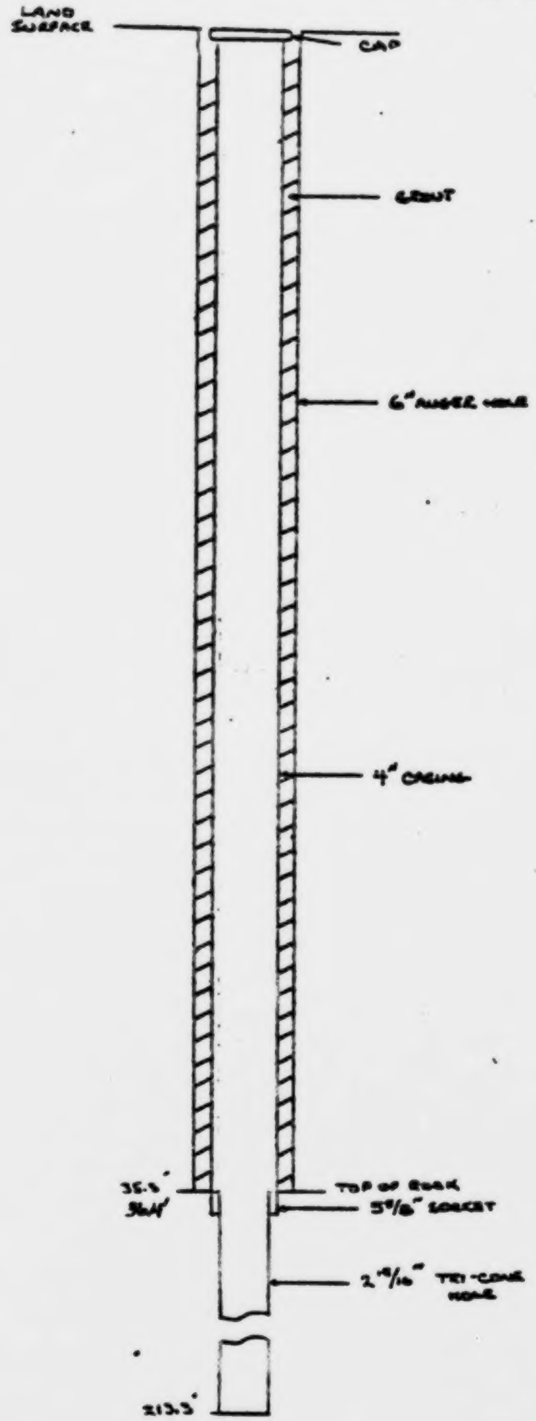
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45
Driller Joe Genovese
Supervisory Geologist Phil Spooner

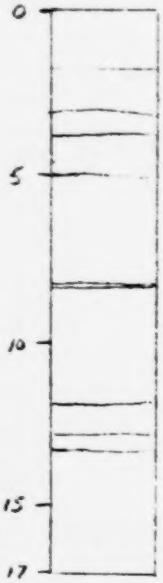
Well No. 72-B-C
Project Love Canal
Location Vacant lot north of 432 99th St.

Prepared By: Phil Spooner
Scale: 1"=5'

Date 10/7/80

WELL LOG

PROFILE



DESCRIPTION

(fill - no sample

clay

silty sandy clay

med. silty clay

clay

yellowish brn

silty layer

clay

gray brn sticky clay

reddish brn sticky clay

gray brn sticky clay

PROJECT Love Canal

OWNER State of New York

WELL NO. 73-A

LOCATION NW corner of 99th St. and Wheatfield

	Date	Time
DRILLING STARTED	10/1/80	1105
DRILLING COMPLETED	10/1/80	1150

DRILLER Joe Genovese

GEOLOGIST Dave Conover

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 574.3

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 61

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 17'

CASING DIAMETER 2" ID

CASING LENGTH 15.6' , 2' sump

SCREEN DIAMETER 2"

SCREEN SETTING 13'-15'

SCREEN SLOT/TYPE Horz. slot, stainless, .0001

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/1/80 @ 1158

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

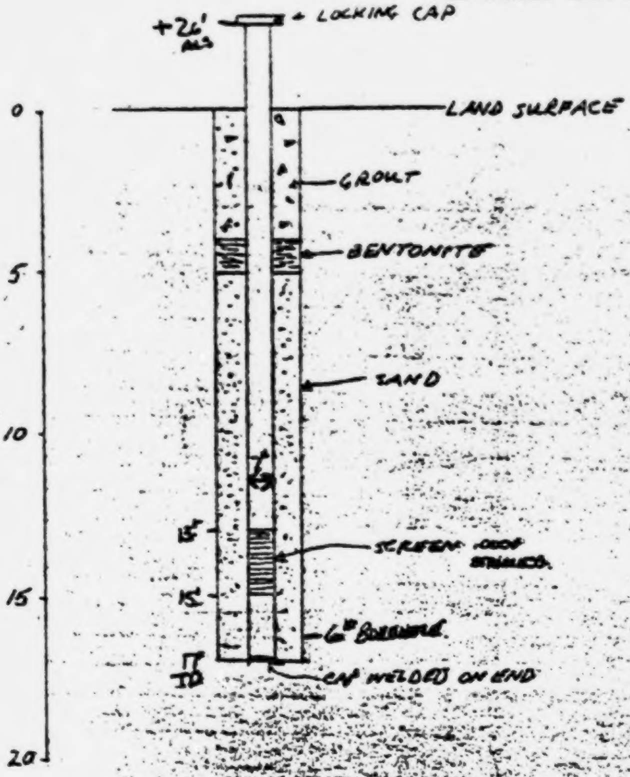
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Log taken from split spoon samples from Hole 73-B

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45
Driller Joe Genovese
Supervisory Geologist Dave Conover

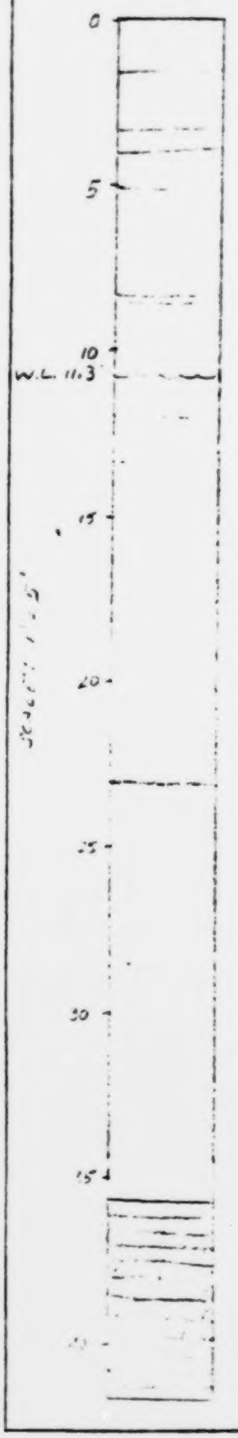
Well No. 73-A
Project Love Canal
Location NW corner of 99th St. and Wheatfield

Date 10/1/80

Prepared By: Dave Conover
Scale: 1"=5'

WELL LOG

PROFILE



DESCRIPTION

fill (no sample)

clay

silty/sandy clay

mod. silty clay

clay

silty layer

clay

gr-brown sticky clay

red-brown sticky clay

gray-brn sticky clay

till

dolomite

PROJECT Love Canal

OWNER State of New York

WELL NO. 73-B

LOCATION NW corner of 99th St. and Wheatfield

	Date	Time
DRILLING STARTED	9/30/80	0845
DRILLING COMPLETED	10/3/80	1445

DRILLER Joe Genovese

GEOLOGIST Dave Conover

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 574.3

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 **PAGES** 58-61, 65, 66

WELL DATA

HOLE DIAMETER 6", 3"

HOLE DEPTH 6":35.7', 3":5' TD: 41.7'

CASING DIAMETER 4"

CASING LENGTH 39.7'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 35.7'

PUMP TEST DATA

STATIC DEPTH TO WATER 11.3' BLS

DATE MEASURED 10/3/80 @ 1730

PUMPING DEPTH TO WATER 17.3' BLS

TEST DURATION 70 min.

PUMPING RATE 40 gpm

TEST DATE 10/3/80

TEST TYPE

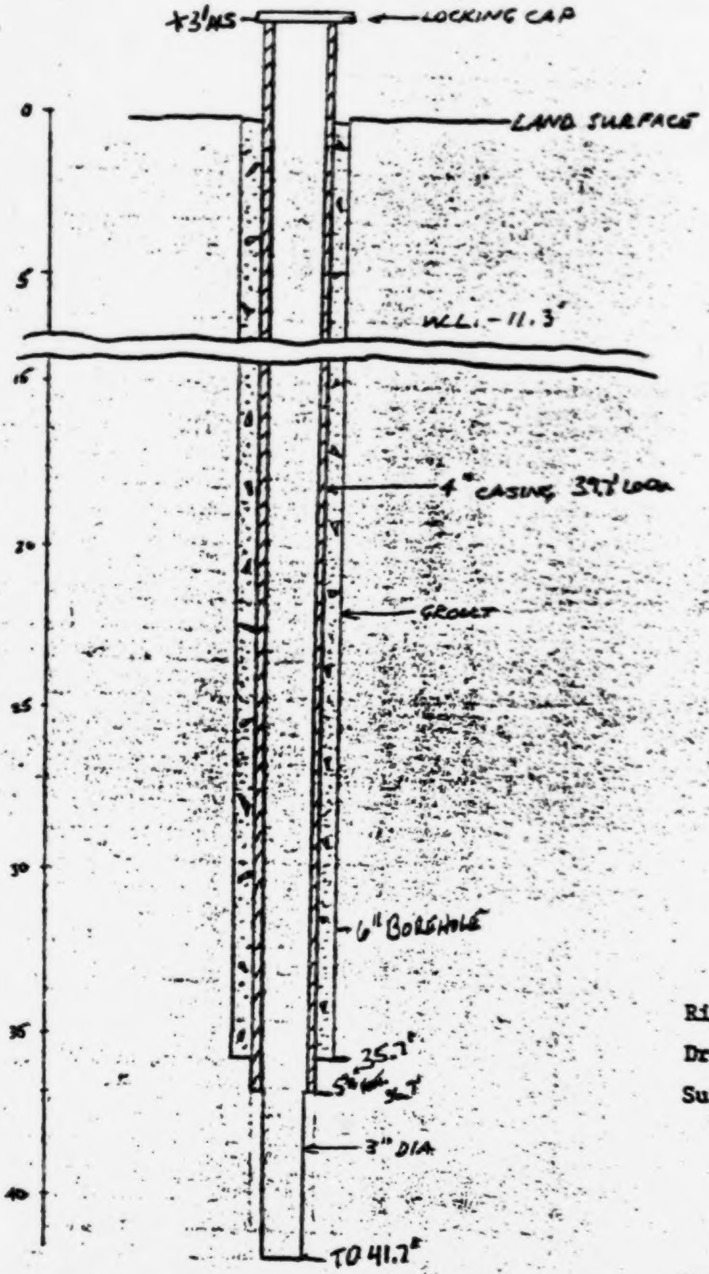
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Log taken from split-spoon samples

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45

Driller Joe Genovese

Supervisory Geologist Dave Conover

Well No. 73-B

Project Love Canal

Location NW corner of 99th St. and Wheatfield

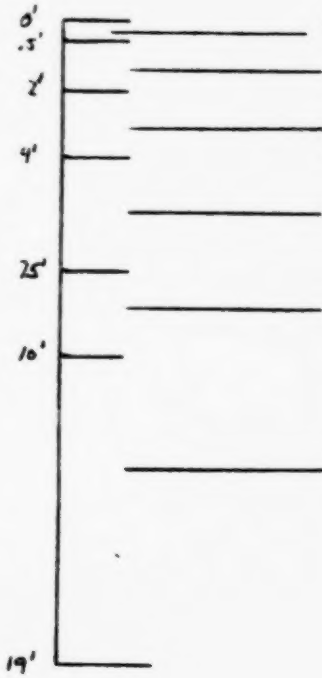
Prepared By: Dave Conover

Scale: 1"=5'

Date 10/3/80

WELL LOG

PROFILE



DESCRIPTION

TOPSOIL, VEGETATION

FILL INCLUDING BLACKTOP FROM PARKING LOT

YELLOW LOAM - DRY SILTY SAND.

YELLOW SANDY LOAM - MOIST

SANDY SILT - RED. DRY

SILTY CLAY - VERY SOFT RED MOIST NO GREY MOTTLING.

PROJECT Love Canal
OWNER State of New York
WELL NO. 74-A
LOCATION NE corner 99th St. School

	Date	Time
DRILLING STARTED	10/3/80	1610
DRILLING COMPLETED	10/3/80	1710

DRILLER Roger Logel
GEOLOGIST Ed Tokarski
RIG TYPE CME-45C
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed 575.4
TOPO POSITION flat lying swamp
PROFILE BY Ed Tokarski
FIELD BOOK NO. 10 PAGES 51-54

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 16.3'
CASING DIAMETER 2"
CASING LENGTH 19'
SCREEN DIAMETER 2"
SCREEN SETTING 14.3'-12.3'
SCREEN SLOT/TYPE .0001'stainless
.0001

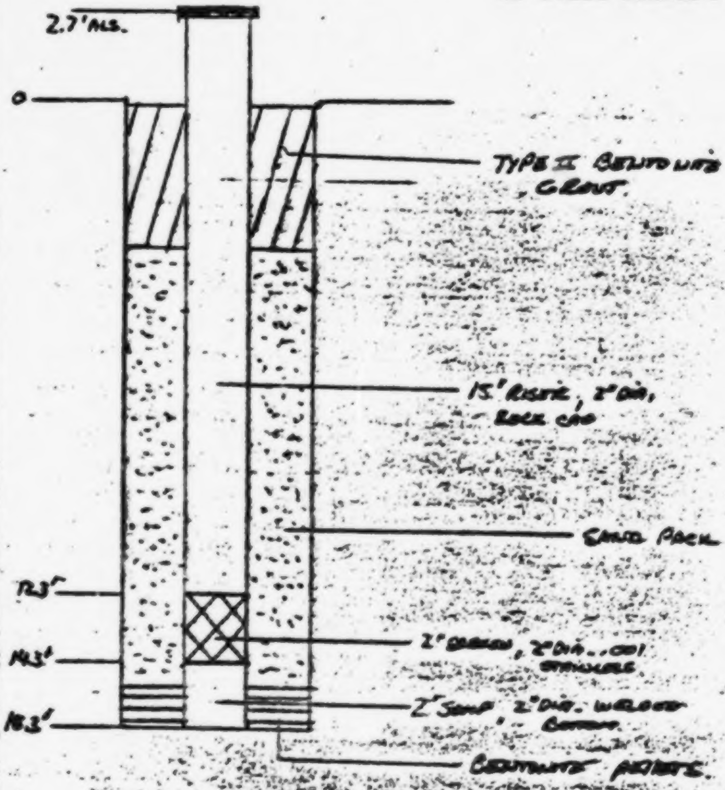
PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 10/3/80 @ 1720
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Heavy rains all day, very muddy conditions

AS-BUILT DRAWING


2.7' ALS.
0
TYPE II BENTONITE GROUT.
15' RISER, 2" DIA, ROCK CAP
SAND PACK
12.3'
14.3'
16.3'
2' SCREEN, 2" DIA. .001 STAINLESS
2' SUMP, 2" DIA. WELDED BOTTOM
BENTONITE PELLETS.

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type A CME-45C
Driller Roger Logel
Supervisory Geologist Ed Tokarski

Well No. 74-A
Project Love Canal
Location NE corner 99th St. School

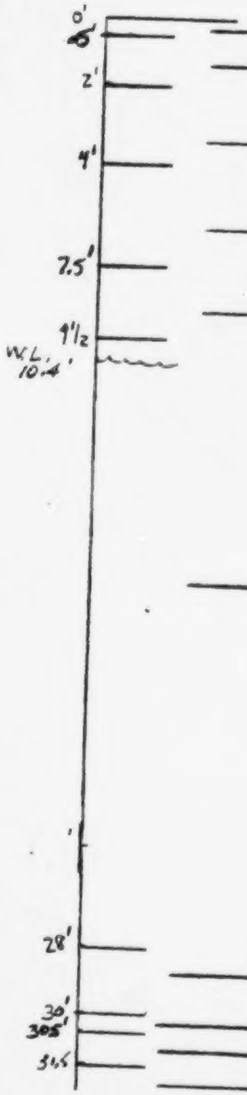
Prepared By: Ed Tokarski
Scale: 1"=5'

Date 10/3/80

WELL LOG

PROFILE

DESCRIPTION



VEGETATION.

Fill - DRY - PIECES OF BLACKTOP - HEAVY SULFER SMELL.

YELLOW LOAM - SULFER SMELL. DRY

YELLOW SANDY/LOAM - MOIST.

SILTY CLAY - RED - DRY SOME GREY MOTTLING.

SOFT CLAY - RED MOIST.

SOFT CLAY - RED - WET.

GRAVEL - WET

Till - DOLOMITE PEBBLES.

BEDROCK - DOLOMITE.

1" = 5'

PROJECT Love Canal
OWNER State of New York
WELL NO. 74-B
LOCATION 99th St. School, NE corner

	Date	Time
DRILLING STARTED	10/3/80	0905
DRILLING COMPLETED	10/6/80	1223

DRILLER Roger Logel
GEOLOGIST Ed Tokarski
RIG TYPE CME-45C
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed 575.4
TOPO POSITION flat lying
PROFILE BY Ed Tokarski
FIELD BOOK NO. 10 PAGES 51-53,59,60

WELL DATA

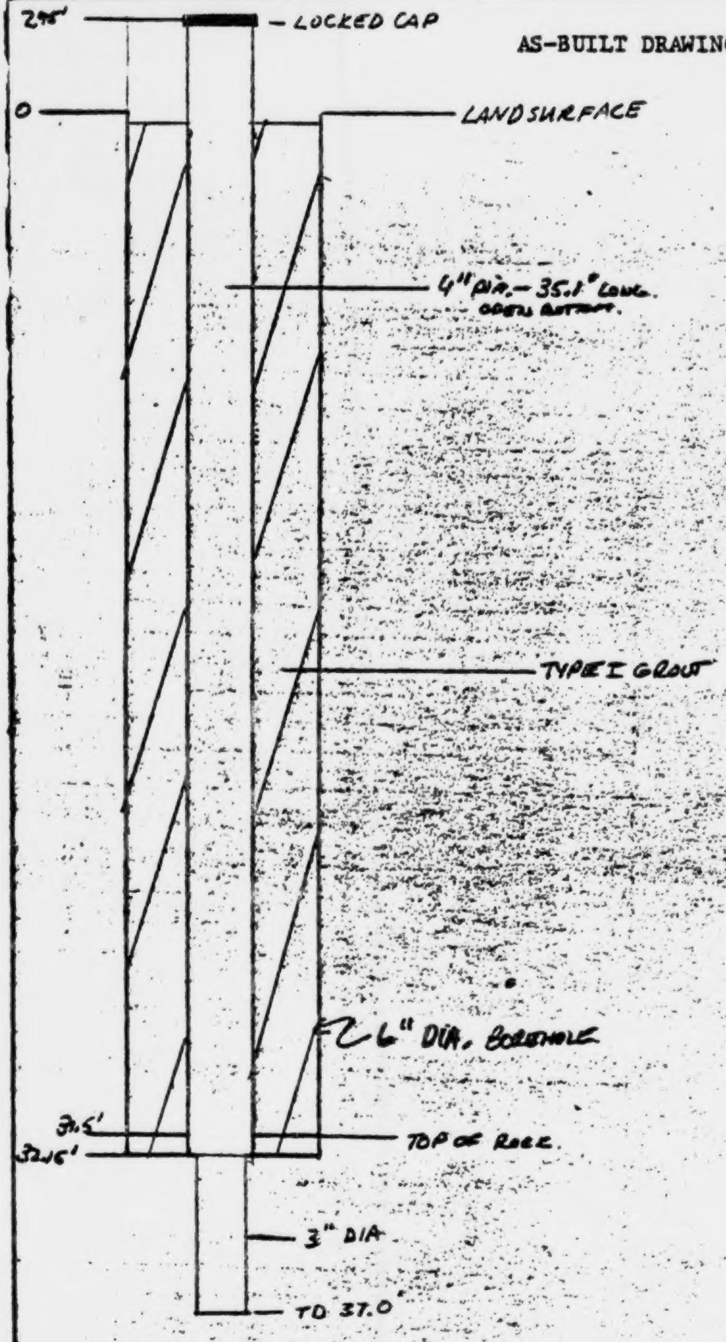
HOLE DIAMETER 6"
HOLE DEPTH 37.0'
CASING DIAMETER 4"
CASING LENGTH 35.1 '
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
DEPTH TO BEDROCK 31.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 10.4'
DATE MEASURED 10/6/80 @ 1338
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist Ed Tokarski

Well No. 74-B

Project Love Canal

Location 99th St. School - NE corner

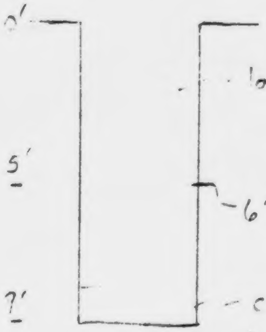
Prepared By: Ed Tokarski

Scale: 1"=5'

Date 10/3/80

WELL LOG

PROFILE **DESCRIPTION**



- loam - dark brown and light yellow brown layers with pebbles and stones
- 6" to 1' seam of black peat, organic smelling
- clay - brown to grey brown modelled with red brown clay - moist

PROJECT Love Canal
OWNER State of New York
WELL NO. 75-A
LOCATION SW corner of 99th and Colvin

	Date	Time
DRILLING STARTED	10/6/80	0954
DRILLING COMPLETED	10/6/80	1012

DRILLER Ed Cole
GEOLOGIST David Robertson
RIG TYPE Acker AD-2
REFERENCE POINT ground level
R.P. ELEVATION not yet surveyed 574.1
TOPO POSITION flat lying
PROFILE BY David Robertson
FIELD BOOK NO. 5 PAGES 91-92

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 9'
CASING DIAMETER 2"
CASING LENGTH 12'
SCREEN DIAMETER 2"
SCREEN SETTING 7'-5'
SCREEN SLOT/TYPE 100 slot - stainless steel

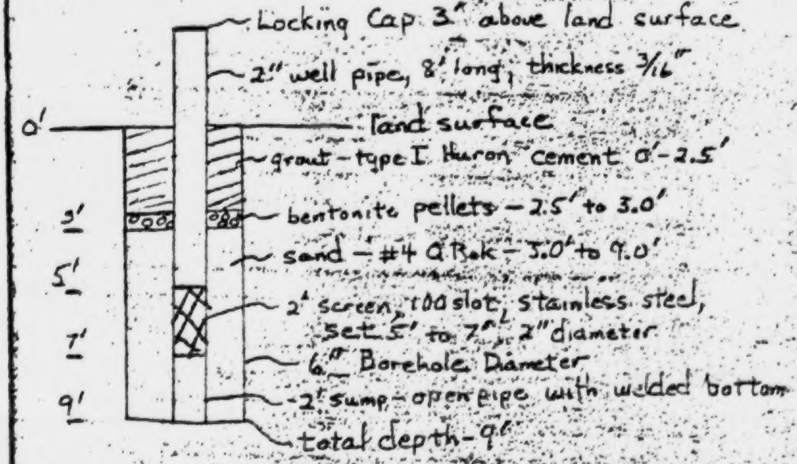
PUMP TEST DATA

STATIC DEPTH TO WATER 4.3'
DATE MEASURED 10/7/80 @ 1444
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

AS-BUILT DRAWING



Locking Cap 3" above land surface
2" well pipe, 8' long, thickness 3/16"
0'
land surface
grout - type I Huron cement 0'-2.5'
3'
bentonite pellets - 2.5' to 3.0'
sand - #4 Q Rok - 3.0' to 9.0'
5'
2' screen, 100 slot, stainless steel, set 5' to 7', 2" diameter
7'
6" Borehole Diameter
9'
2' sump - open pipe with welded bottom
total depth - 9'

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-Z

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 75-A

Project Love Canal

Location SW corner of 99th and Colvin

Prepared By: David Robertson

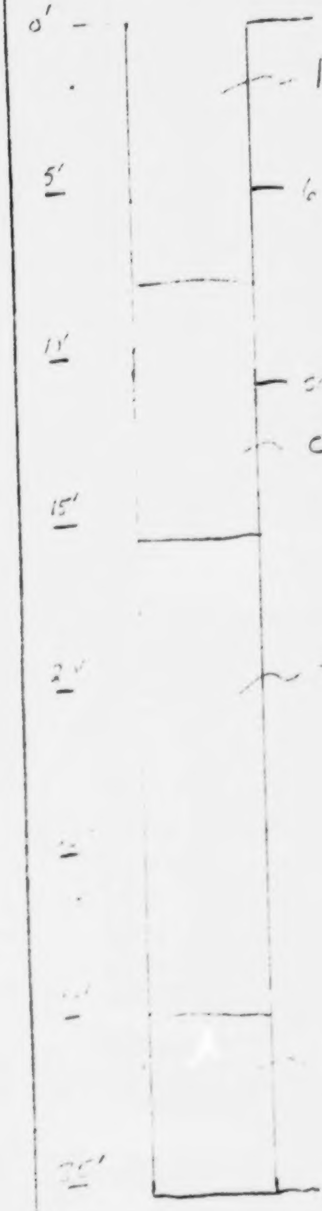
Scale: 1"=5'

Date 10/6/80

WELL LOG

PROFILE

DESCRIPTION



loam - dark brown and light yellow brown layers with pebbles and stones

6" to 1' seam of black peat - organic smelling

seams of cinders ½"-2"

clay - brown to grey brown modelled with red brown clay - moist to wet

Till - stones and cobbles in hard sandy clay matrix

Lockport Dolomite

35.3 total depth

PROJECT Love Canal
OWNER State of New York
WELL NO. 75-B
LOCATION SW corner of Colvin & 99th St.

	Date	Time
DRILLING STARTED	10/4/80	0812
DRILLING COMPLETED	10/7/80	1442

DRILLER Ed Cole
GEOLOGIST David Robertson
RIG TYPE Acker AD-2
REFERENCE POINT land surface
R.P. ELEVATION not yet surveyed 574.1
TOPO POSITION flat lying
PROFILE BY David Robertson
FIELD BOOK NO. 5,11 PAGES 87-92
37-42

WELL DATA

HOLE DIAMETER 6"- 2 15/16"
HOLE DEPTH 35.8' - Total
CASING DIAMETER 4"
CASING LENGTH 34'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
DEPTH TO BEDROCK 30.0'

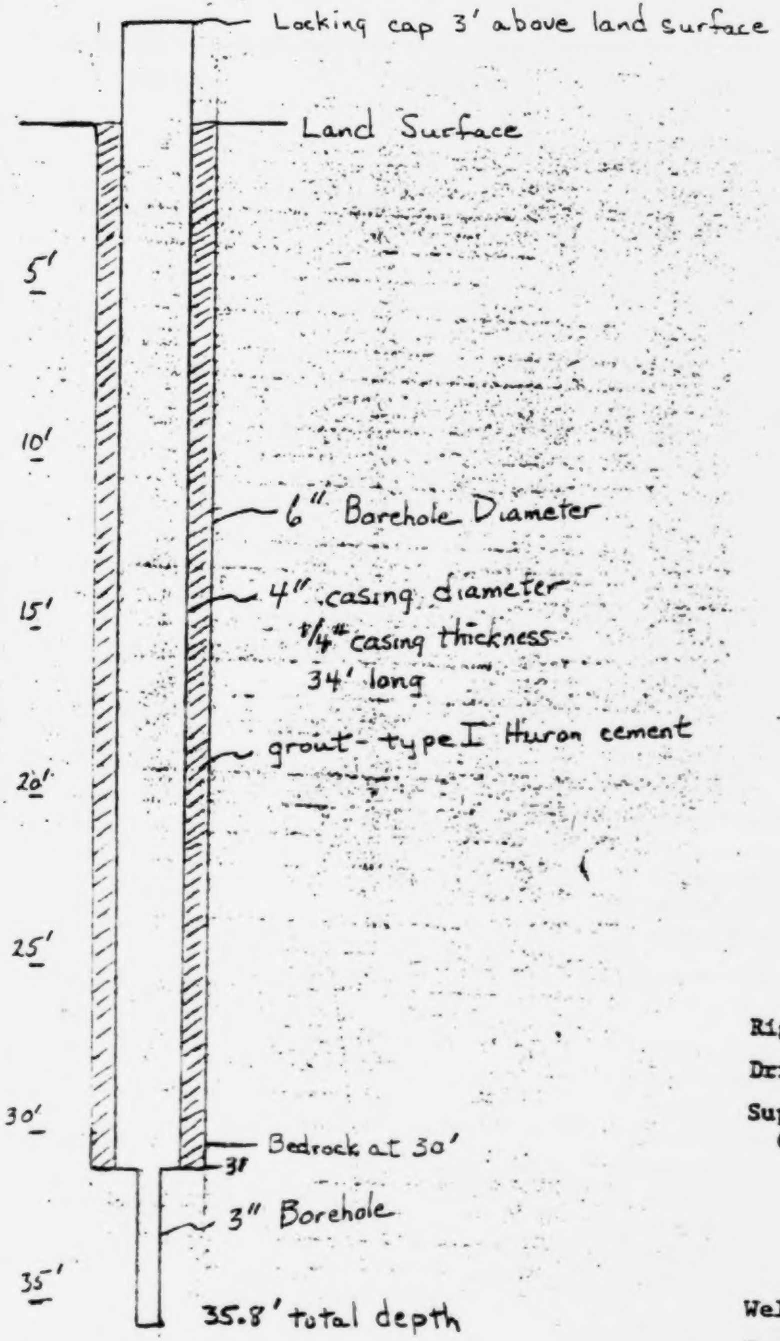
PUMP TEST DATA

STATIC DEPTH TO WATER 10.53'
DATE MEASURED 10/7/80 @ 1704
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Finished well with locking cap. Purged 10/7

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist David Robertson

Well No. 75-B
Project Love Canal
Location SW corner of Colvin and 99th St.

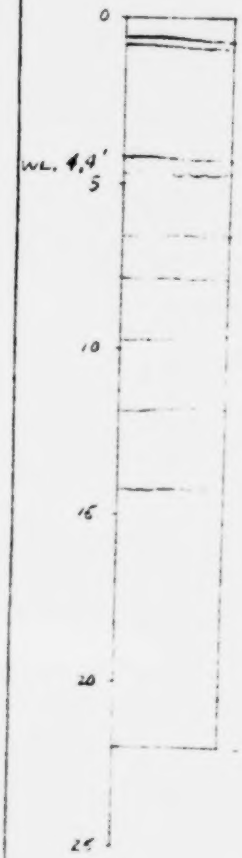
Prepared By: David Robertson
Scale: 1"=5'

Date 10/6/80

WELL LOG

PROFILE

DESCRIPTION



TOPSOIL
YEL-BRN SILTY CLAY

BRN SILTY CLAY WITH BITS OF TRASH (GLASS, WOOD, CINDERS, SLAG) CHEM ODOR

UNCONSOLIDATED TRASH MAT'L SILTY CLAY, BLACK CHEM ODOR
POOR RECOVERY

BLACK SILTY CLAY, ODOR

LT. BRN CLAY

BRN CLAY

MEDIUM BRN PLASTIC CLAY, MOIST

GRAY-BRN CLAY

TILL

PROJECT Love Canal

OWNER State of New York

WELL NO. 76-A

LOCATION 957 97th St.

	Date	Time
DRILLING STARTED	10/3/80	0746
DRILLING COMPLETED	10/3/80	1110

DRILLER Joe Genovese

GEOLOGIST Dave Conover

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 64-65

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 22'

CASING DIAMETER 2" ID

CASING LENGTH 21' + 3'

SCREEN DIAMETER 2"

SCREEN SETTING 18'-20'

SCREEN SLOT/TYPE Horz. slot, stainless, .0001

PUMP TEST DATA

STATIC DEPTH TO WATER not measured

DATE MEASURED

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

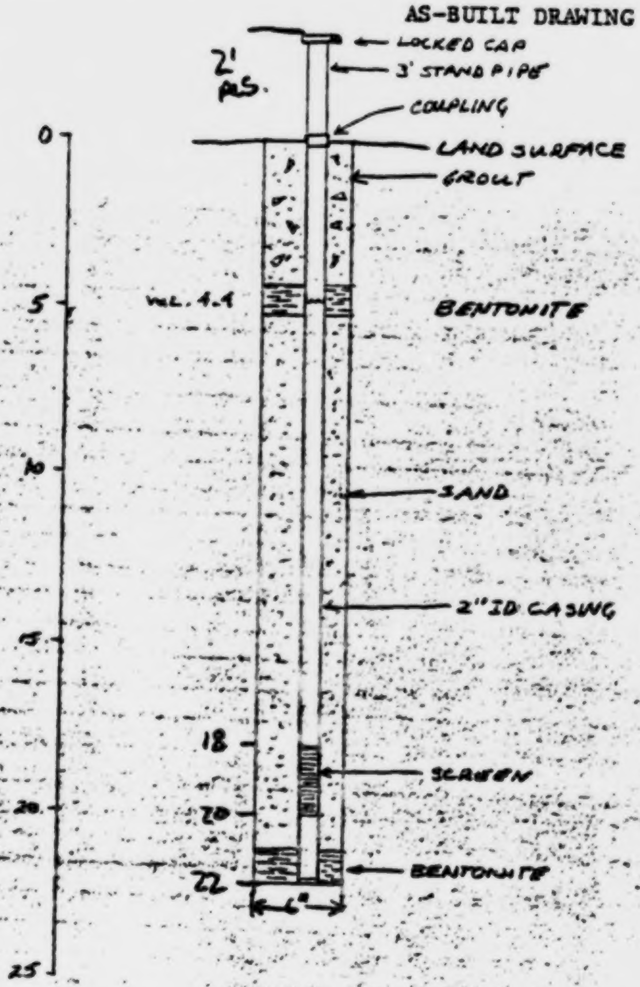
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Log described from split spoon samples taken from hole 76-B

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45

Driller Joe Genovese

Supervisory Geologist Dave Conover

Well No. 76-A

Project Love Canal

Location 957 97th St.

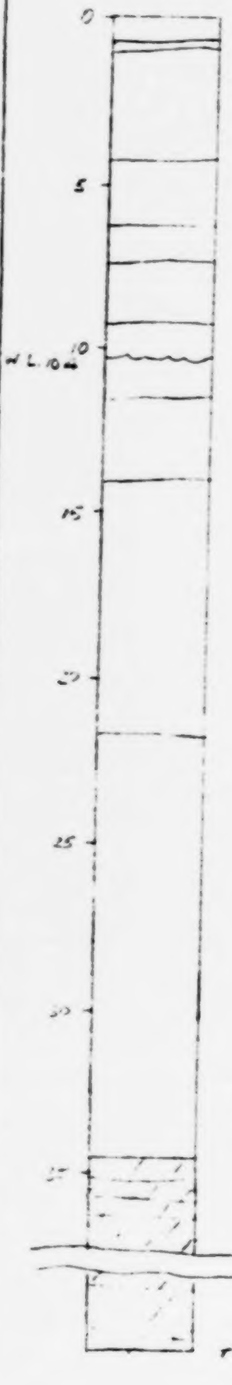
Date 10/3/80

Prepared By: Dave Conover

Scale: 1"=5'

WELL LOG

PROFILE



DESCRIPTION

TOPSOIL
YEL-BRN SILTY CLAY

BRN SILTY CLAY WITH BITS OF TRASH (GLASS, WOOD, CINDERS, SLAG) CHEM. ODOR

UNCONSOLIDATED TRASH MAT'L
BLACK SILTY CLAY, CHEM. ODOR
POOR RECOVERY

BLACK SILTY CLAY, ODOR

LT. BRN CLAY

BRN CLAY

RED-BRN PLASTIC CLAY, MOIST

GRAY BRN CLAY

TILL

DOLOMITE

TD 45.5

PROJECT Love Canal

OWNER State of New York

WELL NO. 76-B

LOCATION 957 97th St.

	Date	Time
DRILLING STARTED	10/1/80	1635
DRILLING COMPLETED	10/4/80	1515

DRILLER Joe Genovese

GEOLOGIST Dave Conover

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 574.9

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 62-64, 68, 69

WELL DATA

HOLE DIAMETER 6", 3"

HOLE DEPTH 45.6'

CASING DIAMETER 4"

CASING LENGTH 38.5'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 34.6'

PUMP TEST DATA

STATIC DEPTH TO WATER 10.4'

DATE MEASURED 10-4-80 @ 1632

PUMPING DEPTH TO WATER not pumped

TEST DURATION

PUMPING RATE

TEST DATE

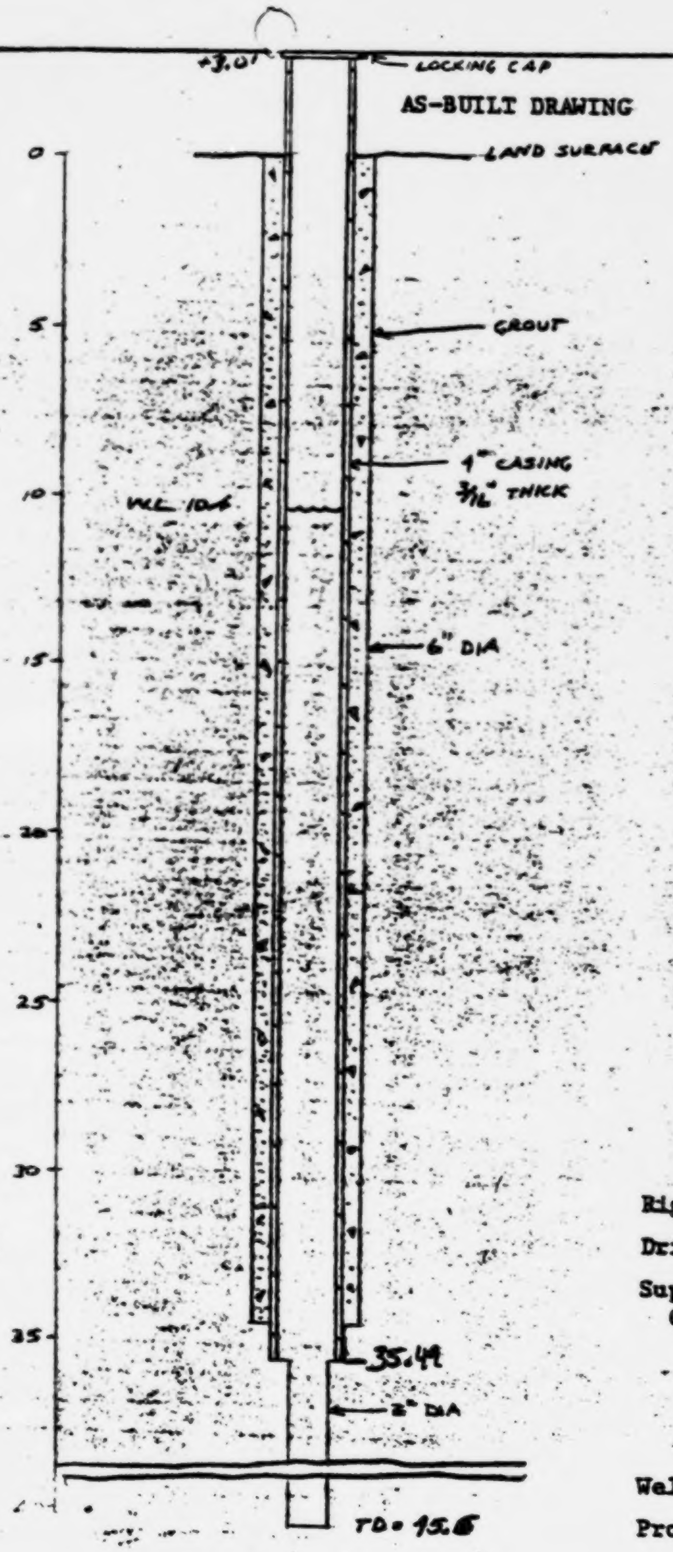
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
- Material
- Diameter
- Slot Openings
- Settings

Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45
Driller Joe Genovese
Supervisory Geologist Dave Conover

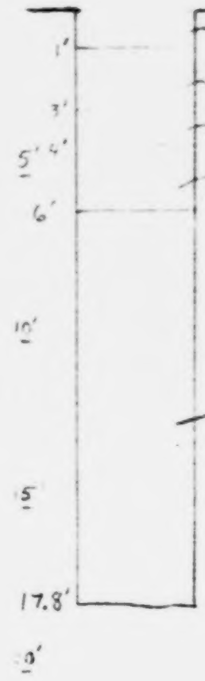
Well No. 76-B
Project Love Canal
Location 957 97th St.

Prepared By: Dave Conover
Scale: 1"-5'

Date 10/4/80

WELL LOG

PROFILE **DESCRIPTION**



loam - brown clay

loam - yellow brown, silty

clay - dark grey silty

sandy clay - yellow brown to grey brown with chemical pesticide smell

clay - brown to grey brown moist to wet with depth

15.6
3.6

PROJECT Love Canal

OWNER State of New York

WELL NO. 77-A

LOCATION 775 97th St. - backyard

	Date	Time
DRILLING STARTED	10/9/80	0943
DRILLING COMPLETED	10/9/80	1058

DRILLER Ed Cole

GEOLOGIST David Robertson

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 575.7

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 5 **PAGES** 103-104

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 17.8'

CASING DIAMETER 2"

CASING LENGTH 21.0'

SCREEN DIAMETER 2"

SCREEN SETTING 15.8'-13.8'

SCREEN SLOT/TYPE .10 slot stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/9/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

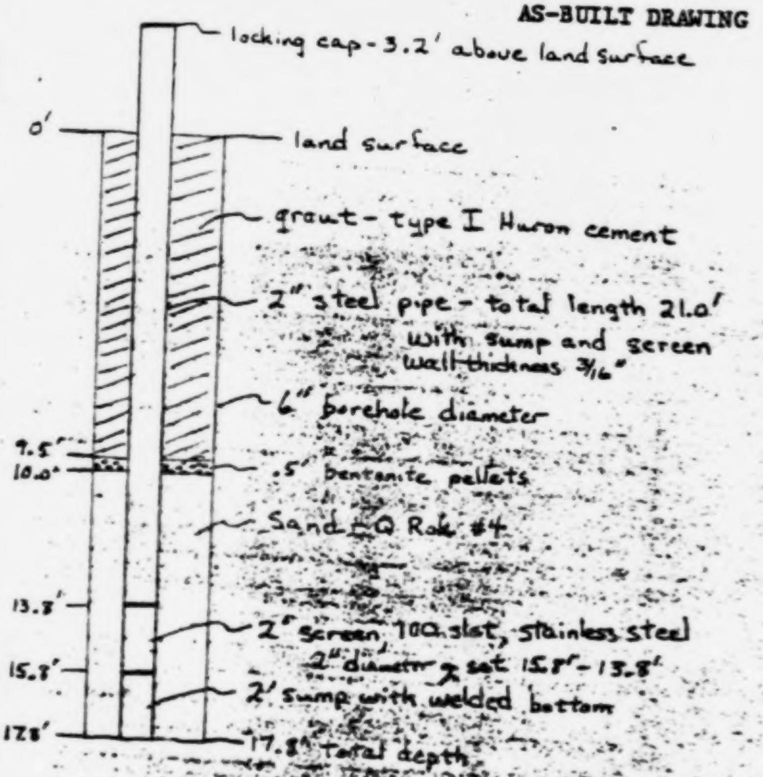
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Finished well with locking cap 3.2' above land surface

AS-BUILT DRAWING


locking cap - 3.2' above land surface
0'
land surface
grout - type I Huron cement
2" steel pipe - total length 21.0'
with sump and screen
wall thickness 3/16"
6" borehole diameter
9.5'
10.0'
.5' bentonite pellets
Sand - Q Rok #4
13.8'
2" screen, 10 slot, stainless steel
2" diameter, set 15.8'-13.8'
15.8'
2' sump with welded bottom
17.8'
17.8' total depth

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 77-A

Project Love Canal

Location 775 97th St. - backyard

Date 10/9/80

Prepared By: David Robertson

Scale: 1"=5'

WELL LOG

PROFILE		DESCRIPTION
0'		brown and red brown clay loam
	1'	yellow brown silty loam
	3'	clay- dark grey, silty with yellow silt layers
5'	5'	Clay - yellow brown to grey brown, sandy with chemical pesticide smell
	7'	
10'		
15'		Clay - brown to grey brown modelled with red brown clay, varying in moisture from slightly moist to wet with depth
20'		
	23'	Till - pebbles and stones in silty clay matrix TRACE chem smell
25'		
30'		
35'		
40'	39'	Lockport Dolomite Total Depth - 45'

PROJECT Love Canal

OWNER State of New York

WELL NO. 77-B

LOCATION 775 97th St. - backyard

	Date	Time
DRILLING STARTED	10/8/80	0841
DRILLING COMPLETED	10/14/80	1530

DRILLER Ed Cole/Ron Bush

GEOLOGIST David Robertson/Dennis Stanczuk

RIG TYPE Acker AD-2/CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 575.7

TOPO POSITION edge of clay cap - slight slope

PROFILE BY David Robertson

FIELD BOOK NO. 5, 2 PAGES 99-103,123

WELL DATA

HOLE DIAMETER 6"/2 15/16"

HOLE DEPTH 39'/45'

CASING DIAMETER 4"

CASING LENGTH 43'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 39'

PUMP TEST DATA

STATIC DEPTH TO WATER 15.2'

DATE MEASURED 10/14/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

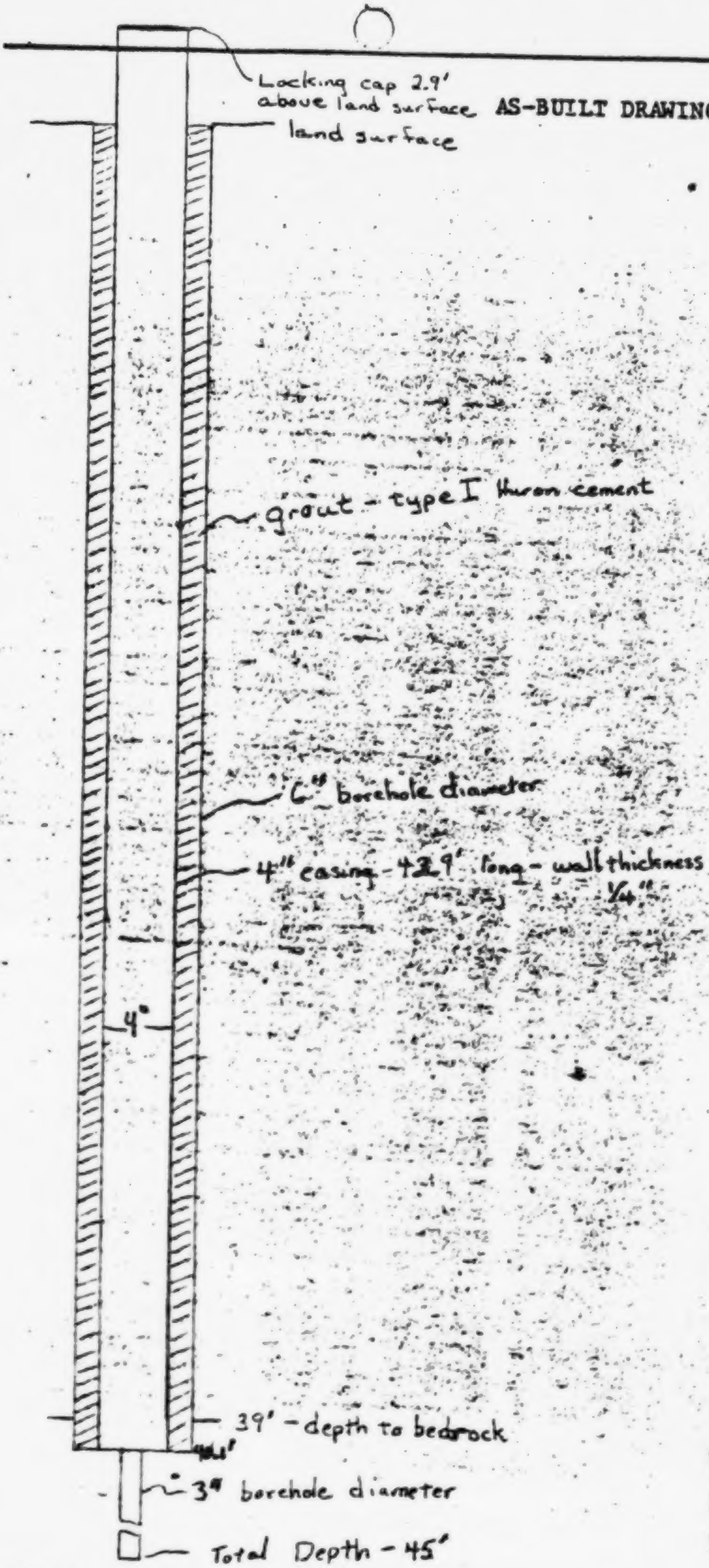
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Ron Bush cored into rack for the second stage of drilling this B well

AS-BUILT DRAWING


Locking cap 2.9' above land surface
land surface
grout - type I Huron cement
6" borehole diameter
4" casing - 42.9' long - wall thickness 1/4"
4"
39' - depth to bedrock
40'
3" borehole diameter
Total Depth - 45'

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 77-B

Project Love Canal

Location 775 97th St. - backyard

Prepared By: David Robertson

Scale: 1"=5'

Date 10/9/80

WELL LOG

PROFILE	DESCRIPTION
0	
	DARK BROWN SILT WITH SOME FILL MATERIAL, DRY
2.5'	GRAYSILTY CLAY WITH BROWN FINE SAND, DRY
3.0'	BLACK AND WHITE POWDERY MATERIAL, DRY
3.5'	
4.0'	GRAY SILTY CLAY WITH BROWN FINE SAND, SLIGHTLY MOIST
	BROWN SILTY CLAY, MOIST + COHESIVE
8'	
	REDDISH GRAY BROWN SILTY CLAY
10	
	BROWN SILTY CLAY, REDCLAY VARVES FINE GRAY SAND INCLUSION(TREE ROOTS), GRAY CLAY BANDS, WHITE LAYER - LOOKS LIKE A PASTE.
12'	
	REDDISH GRAY CLAY RED CLAY AND GRAY CLAY BANDS RANGES SOFT TO VERY PLASTIC, TOP(12') TO BOTTOM(24')
24'	
	SOFT REDDISH BROWN TILL WITH PEBBLES
27'	
	HARD REDDISH BROWN TILL WITH PEBBLES
28.2'	

PROJECT Love Canal

OWNER State of New York

WELL NO. 78-A

LOCATION 766 97th St.

	Date	Time
DRILLING STARTED	10/4/80	1420
DRILLING COMPLETED	10/6/80	1205

DRILLER Mike Warner

GEOLOGIST Dennis Stanczuk/Tom Bolyard

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed

TOPO POSITION flat lying

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2/6 PAGES 87-89/100

WELL DATA

HOLE DIAMETER 6.5"

HOLE DEPTH 28.2'

CASING DIAMETER 2"

CASING LENGTH 31.6'

SCREEN DIAMETER 2"

SCREEN SETTING 24'-22'

SCREEN SLOT/TYPE .001 " stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/6/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

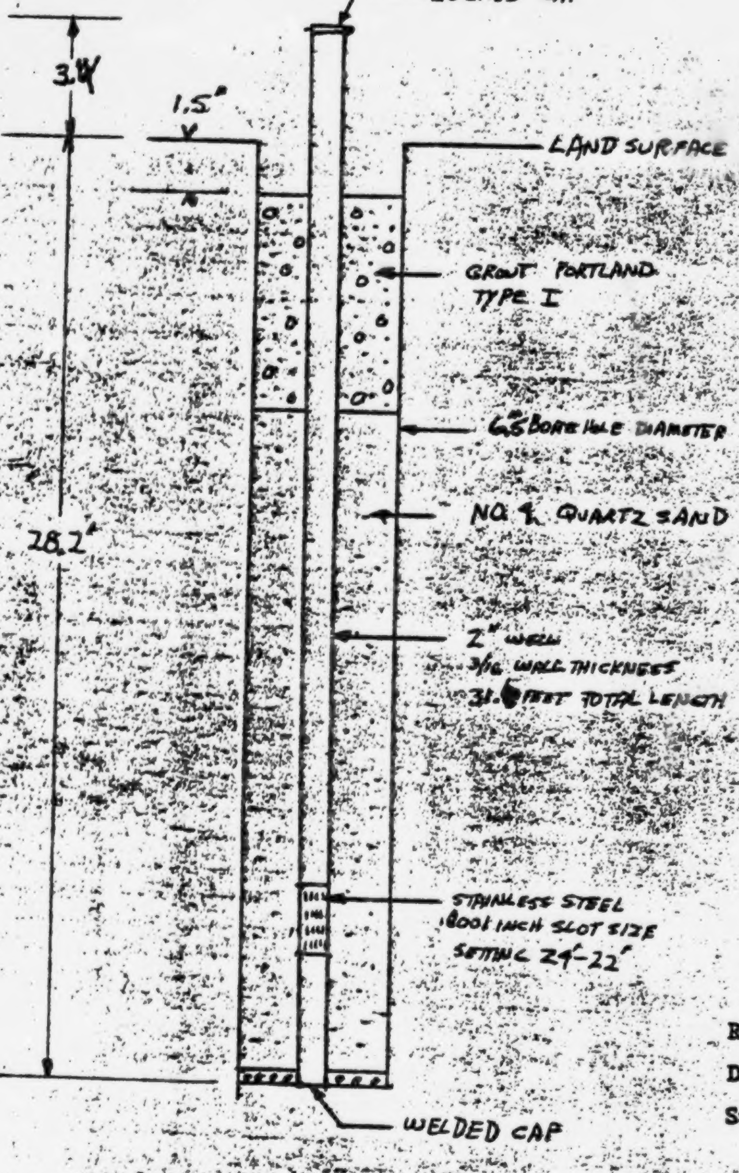
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dennis Stanczuk

Well No. 78-A

Project Love Canal

Location 766 97th St.

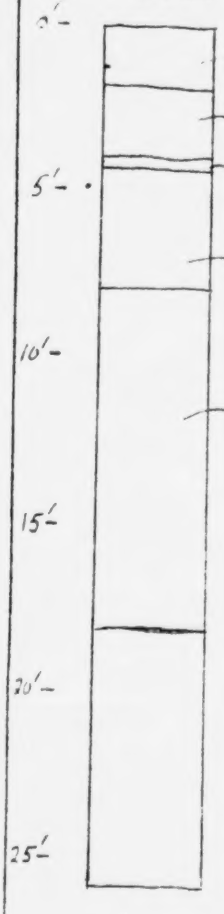
Date 10/6/80

Prepared By: Dennis Stanczuk

Scale: 1"=5'

WELL LOG

PROFILE **DESCRIPTION**



0'-2' Clay - dark brown

2'-4' - Clayg light brown hard and dry

2" sandstone lense yellowish grey silty sand, compacted

4'-8' clay, brown hard and dry

8'-18' clay brown to grey brown varying from slightly moist to wet with depth

18'-26' clay - red brown to light red brown, wet, occasionally pebbly

PROJECT Love Canal
OWNER State of New York
WELL NO. 79-A
LOCATION 722 97th St., in backyard

	Date	Time
DRILLING STARTED	10/1/80	1020
DRILLING COMPLETED	10/2/80	1153

DRILLER Ed Cole
GEOLOGIST David Robertson
RIG TYPE Acker AD-2
REFERENCE POINT ground surface
R.P. ELEVATION not yet surveyed 575.1
TOPO POSITION flat lying
PROFILE BY David Robertson
FIELD BOOK NO. 5 PAGES 73-75,79-80

WELL DATA

HOLE DIAMETER 6"
HOLE DEPTH 26'
CASING DIAMETER 2"
CASING LENGTH 29'
SCREEN DIAMETER 2"
SCREEN SETTING 24'-22'
SCREEN SLOT/TYPE 10. slot/ stainless steel

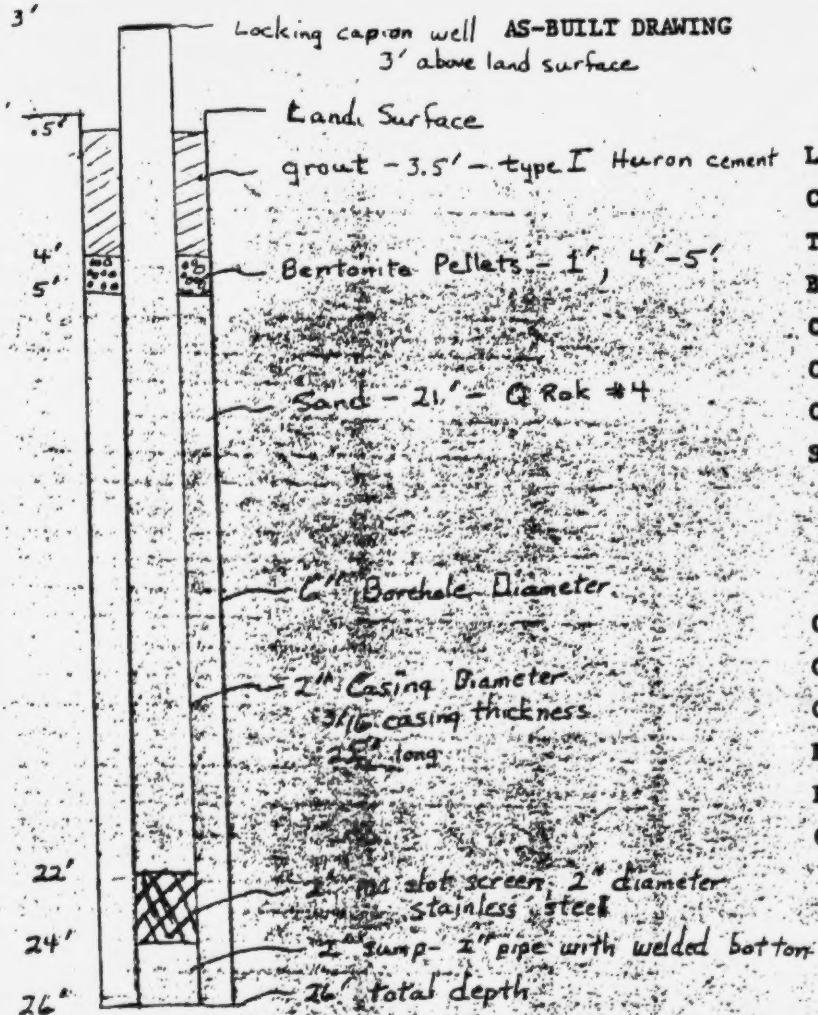
PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 10/4/80 @ 1630
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 79-A

Project Love Canal

Location 722 97th St., in backyard

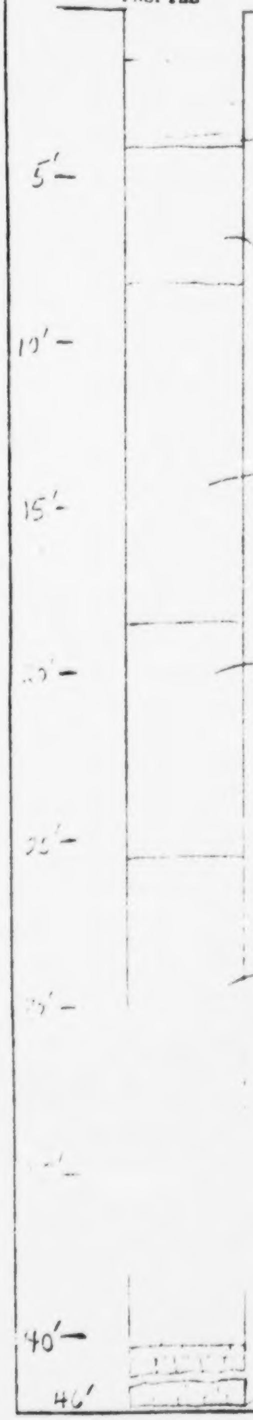
Prepared By: David Robertson

Scale: 1"=5'

Date 10/2/80

WELL LOG

PROFILE



DESCRIPTION

0'-2' - Clay, dark brown with loamy topsoil

2'-4' - Clay, light brown hard and dry

2" Sandstone lense yellowish grey silty compacted sand

clay - brown, hard and dry 4'-8'

clay - brown to grey brown varying from slight moist to wet with depth 8'-18'

clay - red brown to light red brown wet - occasionally pebbly

till - 26'-40.2', Dolomite, Shale and Sandstone pebbles in soft silty clay to hard dry clay matrix

Lockport Dolomite

total Depth - 46'

PROJECT Love Canal
OWNER State of New York
WELL NO. 79-B
LOCATION 722 97th St., in backyard

	Date	Time
DRILLING STARTED	10/1/80	1020
DRILLING COMPLETED	10/3/80	1537

DRILLER Ed Cole
GEOLOGIST David Robertson
RIG TYPE Acker AD-2
REFERENCE POINT ground level
R.P. ELEVATION not yet surveyed 575.1
TOPO POSITION flat lying
PROFILE BY David Robertson
FIELD BOOK NO. 5 PAGES 75-80,85-86

WELL DATA

HOLE DIAMETER 6" - 2 15/16
HOLE DEPTH 41.2' - 46'
CASING DIAMETER 4"
CASING LENGTH 44.0'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
DEPTH TO BEDROCK 41.2'

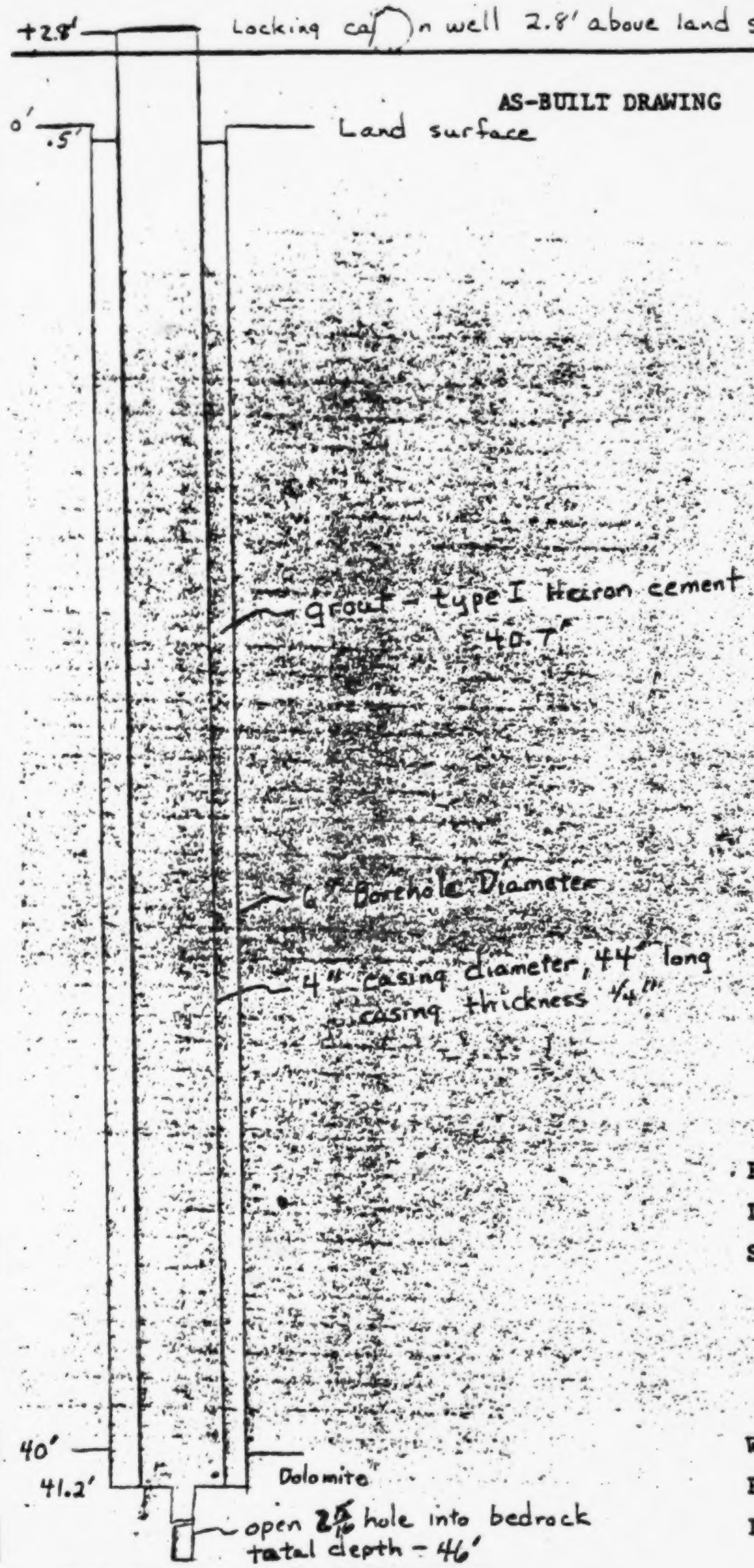
PUMP TEST DATA

STATIC DEPTH TO WATER 10.5'
DATE MEASURED 10/4/80 @ 1630
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

Finished well with locking cap
Purged 10/3/80

AS-BUILT DRAWING


+2.8'
Locking cap on well 2.8' above land surface
0'
.5'
Land surface
grout - type I Huron cement 40.7'
6" Borehole Diameter
4" casing diameter, 44' long casing thickness 1/4"
40'
41.2'
Dolomite
open 2 5/16 hole into bedrock total depth - 46'

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 79-B

Project Love Canal

Location 722 97th St. in backyard

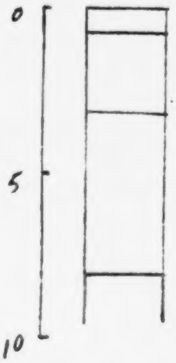
Prepared By: David Robertson

Scale: 1"=5'

Date 10/2/80

WELL LOG

PROFILE



DESCRIPTION

Black topsoil

Reddish Brown loam

Light Brown loam

Reddish Brown moist clay

PROJECT Love Canal
OWNER State of New York
WELL NO. 80-A
LOCATION 759 97th St.

	Date	Time
DRILLING STARTED	9/30/80	1615
DRILLING COMPLETED	9/30/80	1800

DRILLER Ron Bush
GEOLOGIST Tom Farmer
RIG TYPE CME-55
REFERENCE POINT ground level
R.P. ELEVATION not yet surveyed 573.5
TOPO POSITION not yet surveyed
PROFILE BY Tom Farmer
FIELD BOOK NO. 11 PAGES 18

WELL DATA

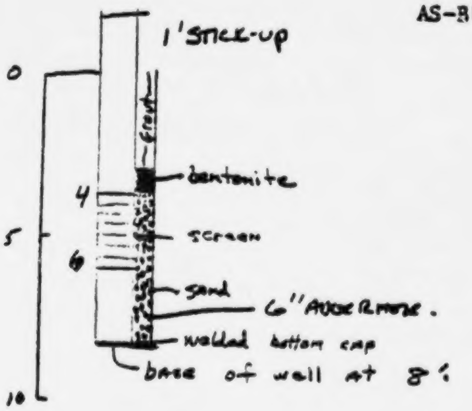
HOLE DIAMETER 6"
HOLE DEPTH 8'
CASING DIAMETER 2"
CASING LENGTH 11'
SCREEN DIAMETER 2"
SCREEN SETTING 6"-4'
SCREEN SLOT/TYPE .10 slot/stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 9/30/80
PUMPING DEPTH TO WATER not measured
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Tom Farmer

Well No. 80-A

Project Love Canal

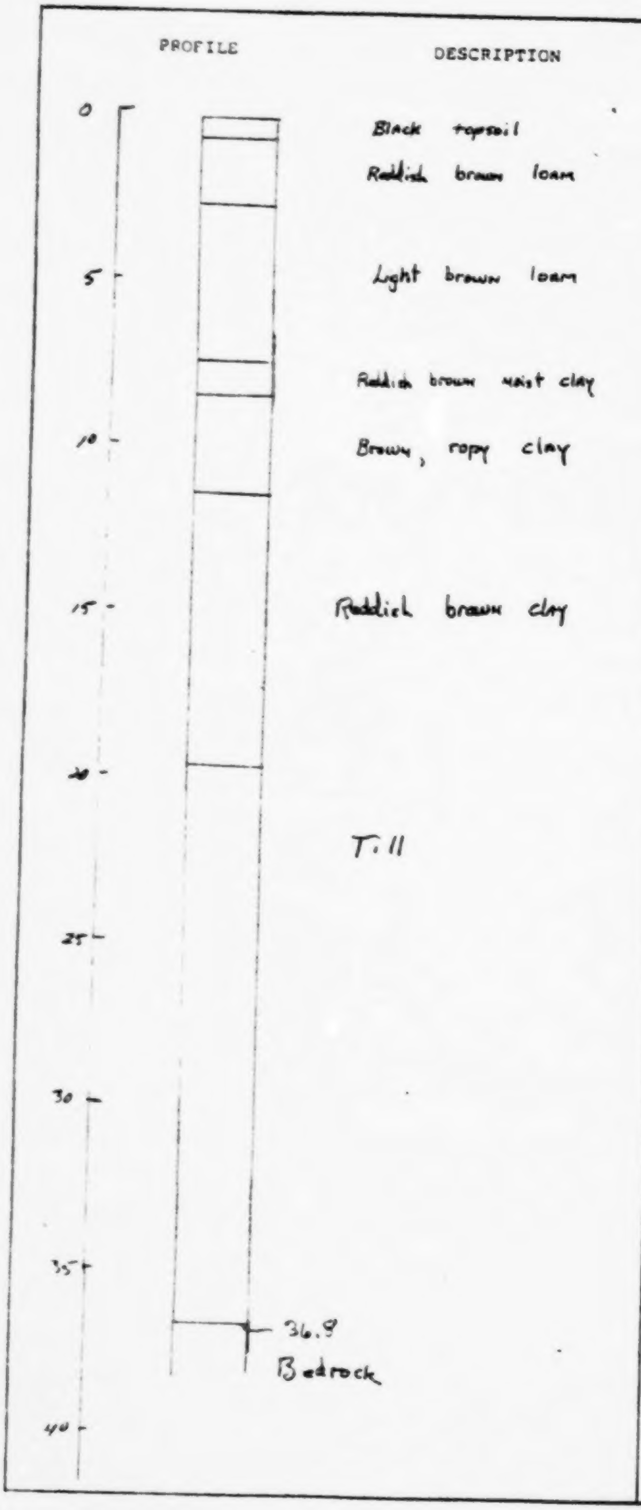
Location 759 97th St.

Date 10/6/80

Prepared By: Tom Farmer

Scale: 1"=5'

WELL LOG



PROJECT Love Canal

OWNER State of New York

WELL NO. 80-B

LOCATION 759 97th St.

	Date	Time
DRILLING STARTED	9/29/80	1425
DRILLING COMPLETED	10/6/80	1007

DRILLER Ron Bush

GEOLOGIST Tom Farmer

RIG TYPE CME-55

REFERENCE POINT ground surface

R.P. ELEVATION not yet surveyed 573.5

TOPO POSITION not yet surveyed

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 PAGES 17-18, 23

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 42.8'

CASING DIAMETER 4"

CASING LENGTH 36.7'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 36.8'

PUMP TEST DATA

STATIC DEPTH TO WATER 1.27'

DATE MEASURED 10-6-80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

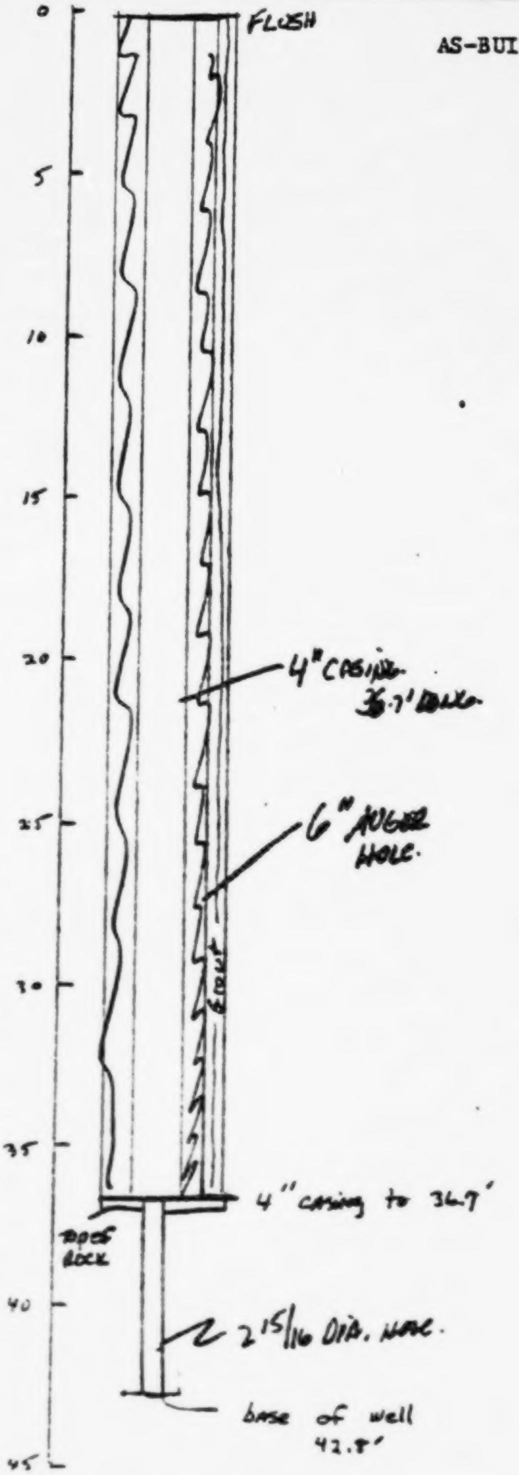
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Tom Farmer

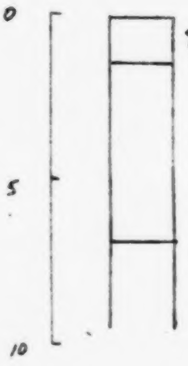
Well No. 80-B
Project Love Canal
Location 759 97th St.

Date 10/6/80

Prepared By: Tom Farmer
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



Brown sandy soil

Brown, discolored black, sandy soil

Dark grey, wet clay

PROJECT Love Canal
OWNER State of New York
WELL NO. 81-A
LOCATION 684 99th St.

	Date	Time
DRILLING STARTED	10/2/80	0905
DRILLING COMPLETED	10/2/80	0940

DRILLER Ron Bush
GEOLOGIST Tom Farmer
RIG TYPE CME-55
REFERENCE POINT ground level
R.P. ELEVATION not yet surveyed 575.1
TOPO POSITION level
PROFILE BY Tom Farmer
FIELD BOOK NO. 11 PAGES 20-21

WELL DATA

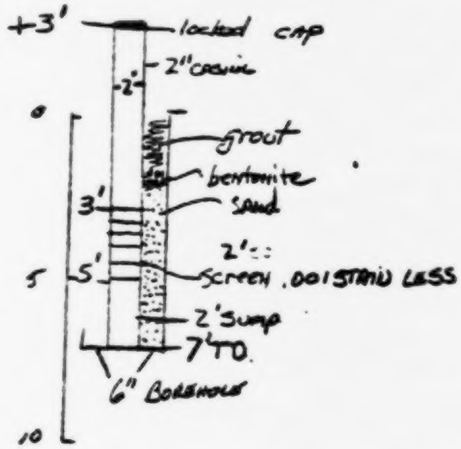
HOLE DIAMETER 6"
HOLE DEPTH 7'
CASING DIAMETER 2"
CASING LENGTH 10'
SCREEN DIAMETER 2"
SCREEN SETTING 3'-5'
SCREEN SLOT/TYPE .0001 Stainless Steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 10/2/80
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Tom Farmer

Well No. 81-A

Project Love Canal

Location 684 99th St.

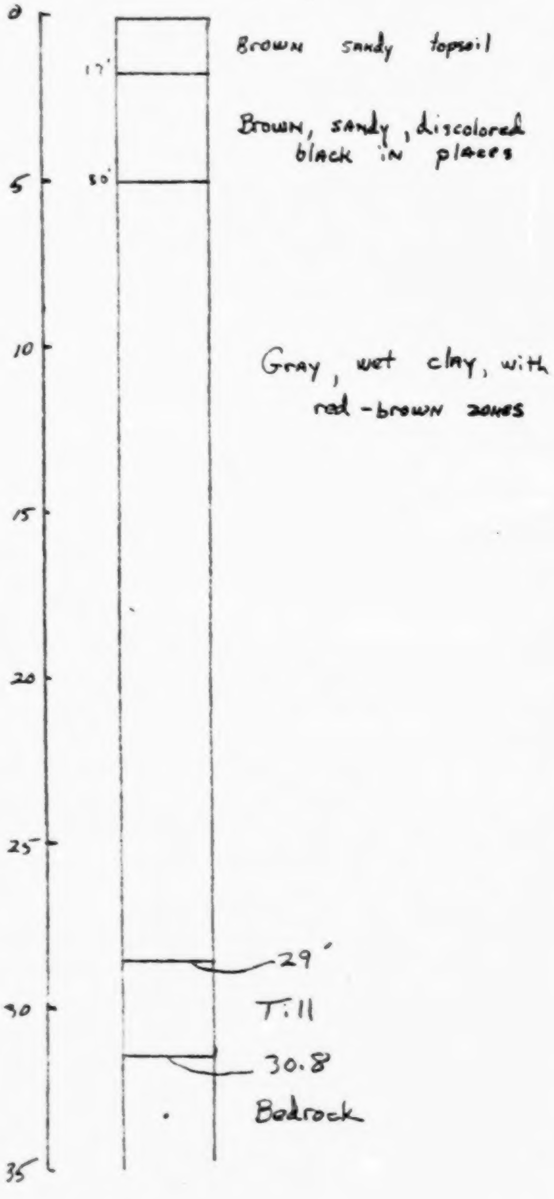
Prepared By: Tom Farmer

Scale: 1"=5'

Date 10/7/80

WELL LOG

PROFILE DESCRIPTION


0
17'
5
50'
10
15
20
25
30
35
29'
30.8
Brown sandy topsoil
Brown, sandy, discolored black in places
Gray, wet clay, with red-brown zones
Till
Bedrock

PROJECT Love Canal

OWNER State of New York

WELL NO. 81-B

LOCATION 684 99th St.

	Date	Time
DRILLING STARTED	10/1/80	1015
DRILLING COMPLETED	10/6/80	1415

DRILLER Ron Bush

GEOLOGIST Tom Farmer

RIG TYPE CME-55

REFERENCE POINT ground level

R.P. ELEVATION not yet surveyed 575.1

TOPO POSITION level

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 PAGES 19-22,29-30

WELL DATA

HOLE DIAMETER 6" - 2 15/16

HOLE DEPTH 36.8' - Total

CASING DIAMETER 4"

CASING LENGTH 34'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 30.8'

PUMP TEST DATA

STATIC DEPTH TO WATER 3.83'

DATE MEASURED 10/6/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

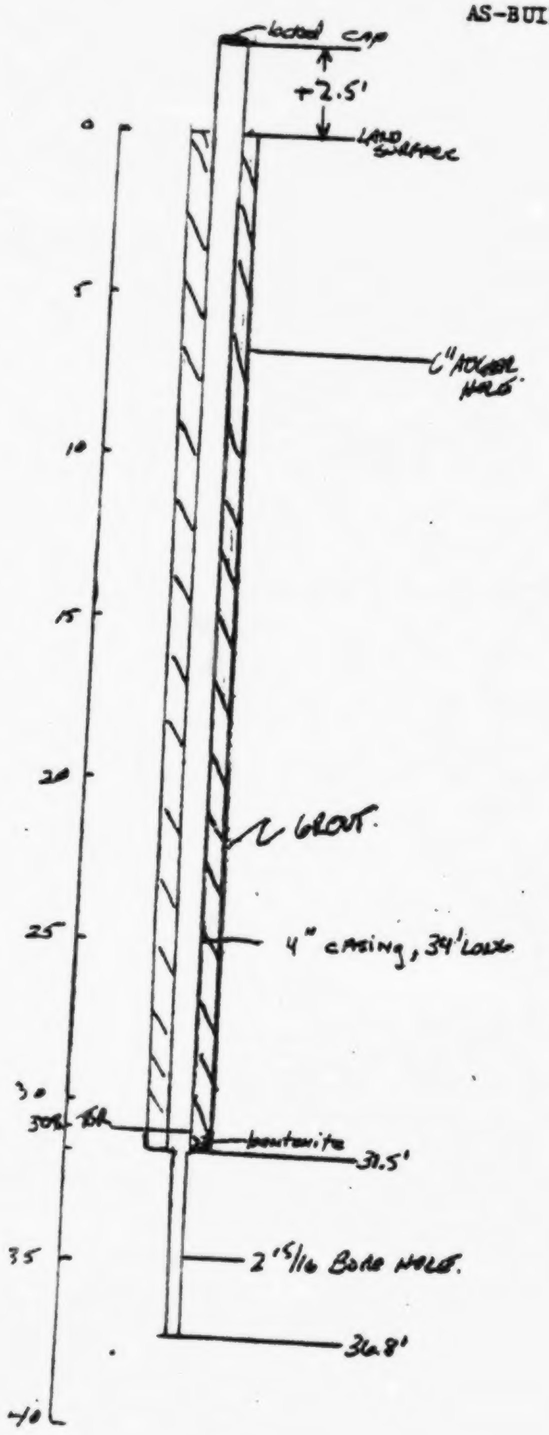
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Tom Farmer

Well No. 81-B
Project Love Canal
Location 684 99th St.

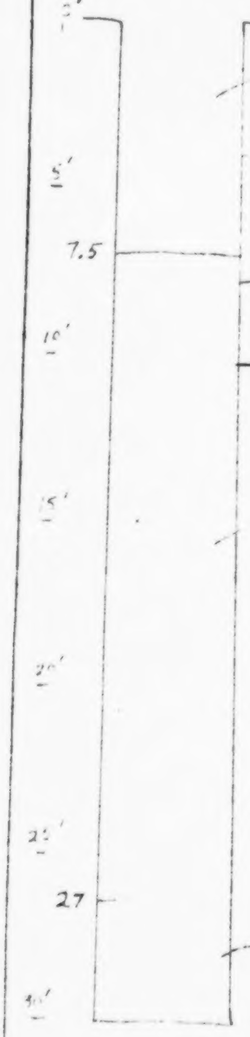
Prepared By: Tom Farmer
Scale: 1"=5'

Date 10/7/80

WELL LOG

PROFILE

DESCRIPTION



dark brown silty loam with yellow brown sand interspersed

wet yellow brown fine grained sand 9" at 4'

Black cinders and sand 4" layer at 8'

Interspersed yellow sand for 3" at 10'

clay - red brown and brown to grey brown modelled

till - fine grained sand to pebbles and stones in hard silty clay matrix

PROJECT Love Canal

OWNER State of New York

WELL NO. 82-A

LOCATION 657 99th St., in front yard

	Date	Time
DRILLING STARTED	10/2/80	1558
DRILLING COMPLETED	10/2/80	1738

DRILLER Ed Cole

GEOLOGIST David Robertson

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 575.0

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 5 PAGES 80-83

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 30'

CASING DIAMETER 2"

CASING LENGTH 33.5'

SCREEN DIAMETER 2"

SCREEN SETTING 28'-26'

SCREEN SLOT/TYPE 10 slot - stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/4/80 @ 1623

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

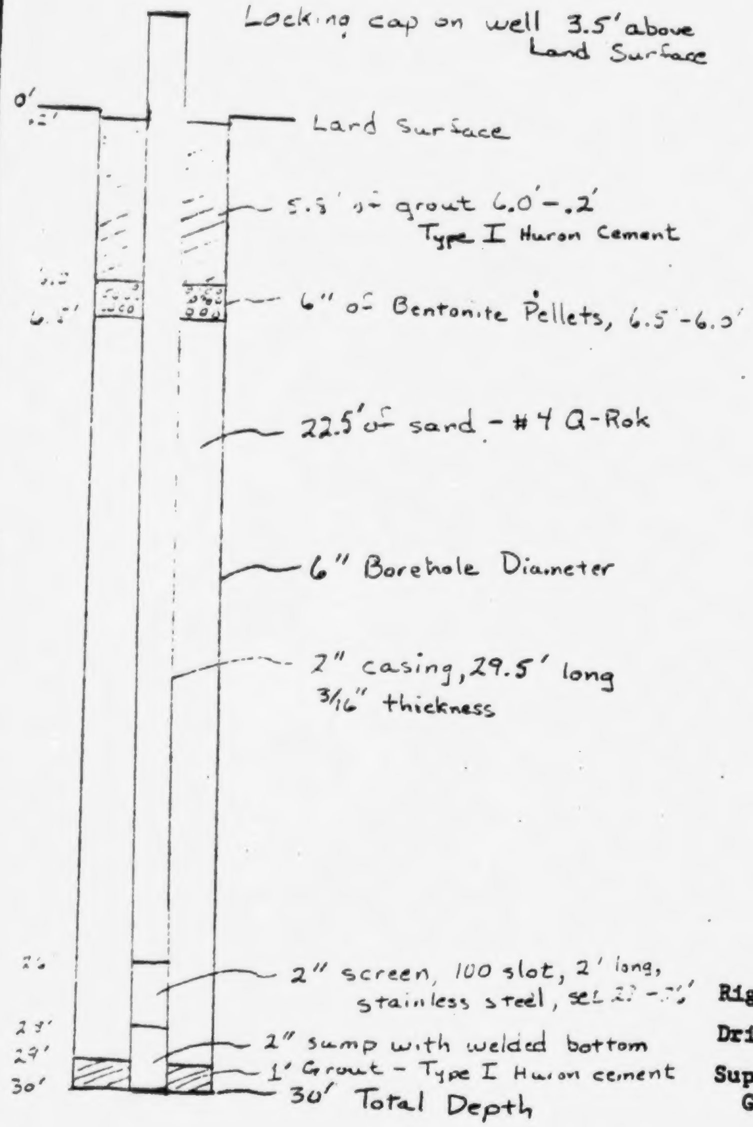
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

AS-BUILT DRAWING


Locking cap on well 3.5' above Land Surface
0'
.2'
Land Surface
5.8' of grout 6.0'-.2'
Type I Huron Cement
6.0
6.5'
6" of Bentonite Pellets, 6.5'-6.0'
22.5' of sand - #4 Q-Rok
6" Borehole Diameter
2" casing, 29.5' long
3/16" thickness
26
28'
29'
30'
2" screen, 100 slot, 2' long, stainless steel, set 26-28'
2" sump with welded bottom
1' Grout - Type I Huron cement
30' Total Depth

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 82-A

Project Love Canal

Location 657 99th St., in frontyard

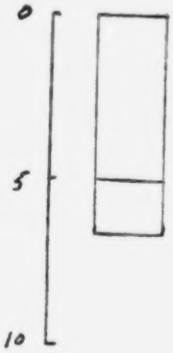
Prepared By: David Robertson

Scale: 1"=5'

Date 10/3/80

WELL LOG

PROFILE DESCRIPTION



Brown sandy soil

Brown moist clay

PROJECT Love Canal

OWNER New York State

WELL NO. 83-A

LOCATION 691 99th St.

	Date	Time
DRILLING STARTED	10/3/80	0830
DRILLING COMPLETED	10/3/80	0900

DRILLER Ron Bush

GEOLOGIST Tom Farmer

RIG TYPE CME-55

REFERENCE POINT ground level

R.P. ELEVATION not yet surveyed 574.5

TOPO POSITION level

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 PAGES 23

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 7'

CASING DIAMETER 2"

CASING LENGTH 10'

SCREEN DIAMETER 2"

SCREEN SETTING 5'-3'

SCREEN SLOT/TYPE 100/stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/6/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

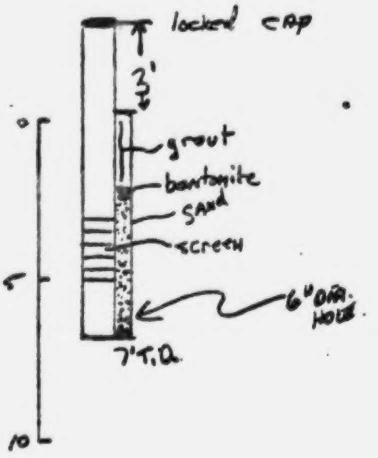
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Tom Farmer

Well No. 83-A

Project Love Canal

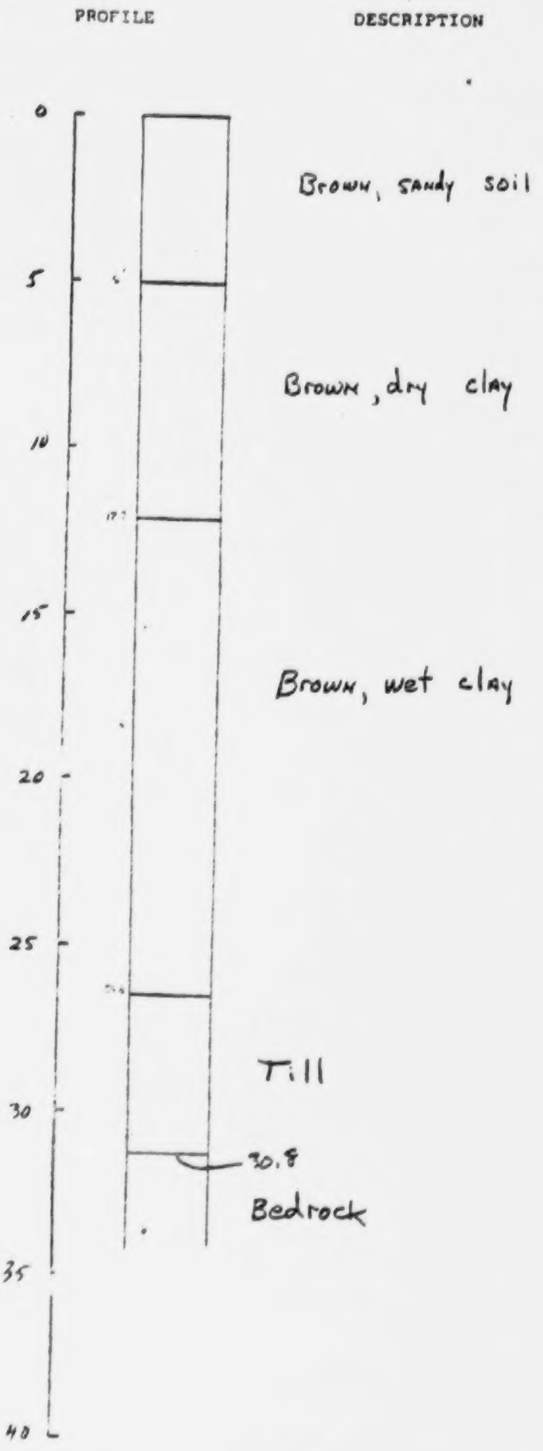
Location 691 99th St.

Prepared By: Tom Farmer

Scale: 1"=5'

Date 10/8/80

WELL LOG



PROJECT Love Canal

OWNER State of New York

WELL NO. 83-B

LOCATION 691 99th St.

	Date	Time
DRILLING STARTED	10/2/80	1315
DRILLING COMPLETED	10/6/80	1714

DRILLER Ron Bush

GEOLOGIST Tom Farmer

RIG TYPE CME-55

REFERENCE POINT ground level

R.P. ELEVATION not yet surveyed 574.5

TOPO POSITION level

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 PAGES 22-23,32-34

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 35.8'

CASING DIAMETER 4"

CASING LENGTH 34'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 30.8'

PUMP TEST DATA

STATIC DEPTH TO WATER 5/77'

DATE MEASURED 10/3/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

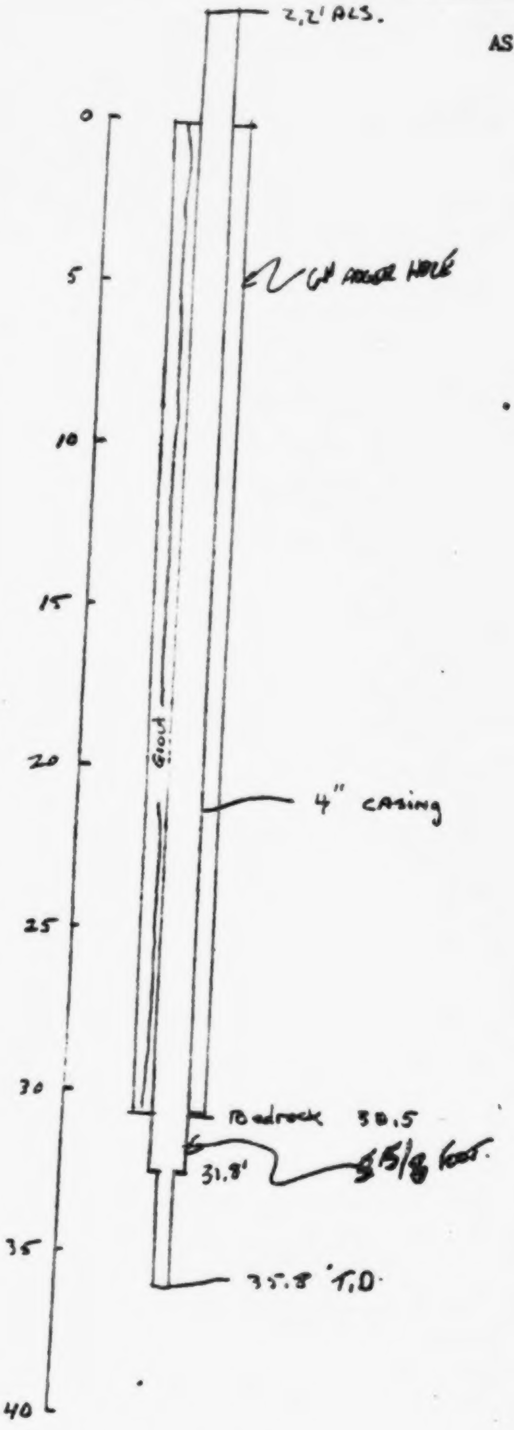
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Tom Farmer

Well No. 83-B

Project Love Canal

Location 691 99th St.

Prepared By: Tom Farmer

Scale: 1"=5'

Date 10/8/80

WELL LOG

PROFILE	DESCRIPTION
0 – 1.5'	Light Brown Silty Clay, dry
1.5' – 84'	Dark Brown Silty Clay, Slightly Moist + Cohesive
84' – 86'	Dark grayish black clayey material, contains some sand, moist, odor like deisel fuel
86' – 136'	Reddish Brown Silty Clay, contains brown silty partings, very moist and cohesive

PROJECT Love Canal

OWNER State of New York

WELL NO. 84-A

LOCATION 973 97th St. - directly in front of house

	Date	Time
DRILLING STARTED	10/1/80	1000
DRILLING COMPLETED	10/1/80	1145

DRILLER Mike Warner

GEOLOGIST Tom Bolyard

RIG TYPE CME-55

REFERENCE POINT ground surface

R.P. ELEVATION not yet surveyed 574.4

TOPO POSITION flat lying

PROFILE BY Tom Bolyard

FIELD BOOK NO. 6 PAGES 90 & 91

WELL DATA

HOLE DIAMETER 7"

HOLE DEPTH 13.6'

CASING DIAMETER 2"

CASING LENGTH 17'

SCREEN DIAMETER 2"

SCREEN SETTING 10'-12'

SCREEN SLOT/TYPE .0001'

PUMP TEST DATA

STATIC DEPTH TO WATER 2.5'

DATE MEASURED 10/7/80 @ 1600

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

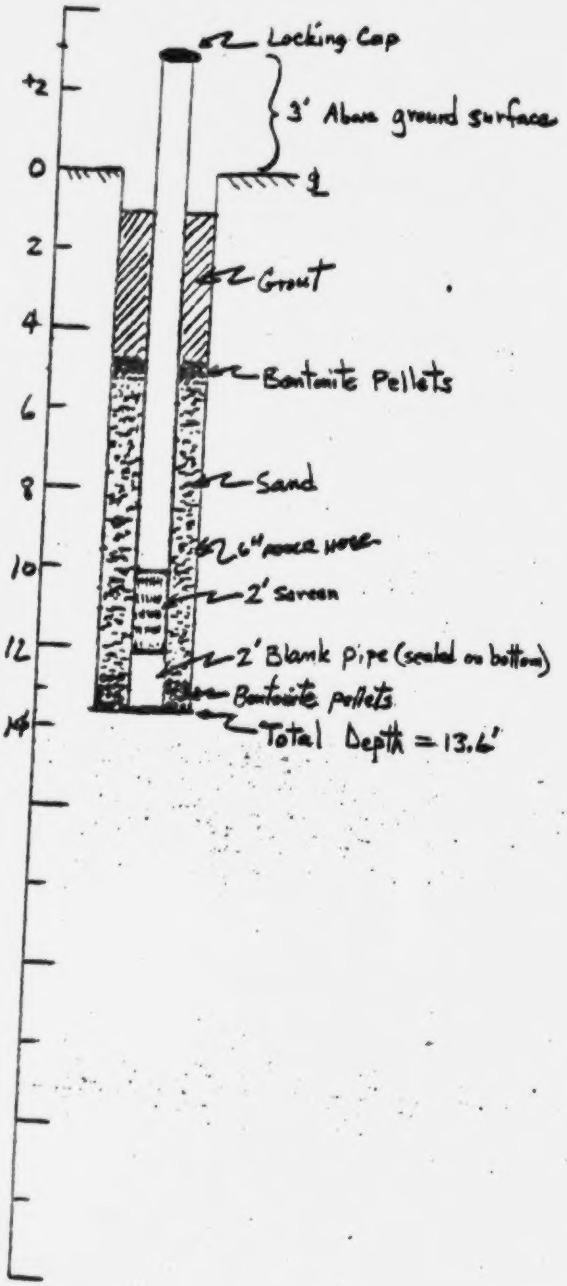
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING

#84-A



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Mike Warner
Supervisory Geologist Tom Bolyard

Well No. 84-A
Project Love Canal
Location Directly in front of house #973 on 97th St.
Date 10/1/80

Prepared By: Tom Bolyard
Scale: 1" = 4'

WELL LOG

PROFILE	DESCRIPTION
0	
	Light Brown Silty Clay, dry
1.5'	
	Dark Brown Silty Clay, Slightly Moist & Cohesive
5'	Encountered water
	Dark grayish black clayey material with some sand grit, very moist & soupy, odor like deisel fuel
7'	
	Reddish Brown Silty Clay, with Brown silty Partings; very moist and cohesive; more resistant to drilling; water saturated
20'	
	Till - hard drilling, gravel, sand, and some small boulders
35.4'	
	Bedrock - Lockport Dolomite
41.4'	

PROJECT Love Canal

OWNER State of New York

WELL NO. 84-B

LOCATION 973 97th St. - directly in front of house

	Date	Time
DRILLING STARTED	9/30/80	0930
DRILLING COMPLETED	10/3/80	1610

DRILLER Mike Warner

GEOLOGIST Tom Bolyard

RIG TYPE CME-55

REFERENCE POINT ground surface

R.P. ELEVATION not yet surveyed 574.4

TOPO POSITION flat lying

PROFILE BY Tom Bolyard

FIELD BOOK NO. 6 PAGES 86-89,95-97

WELL DATA

HOLE DIAMETER 7" from 0 to 36.4'; 3" to 41.4'

HOLE DEPTH 41.4'

CASING DIAMETER 4"

CASING LENGTH 36' +3' pipe

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 35.4'

PUMP TEST DATA

STATIC DEPTH TO WATER 9'

DATE MEASURED 10/7/80 @ 1600

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

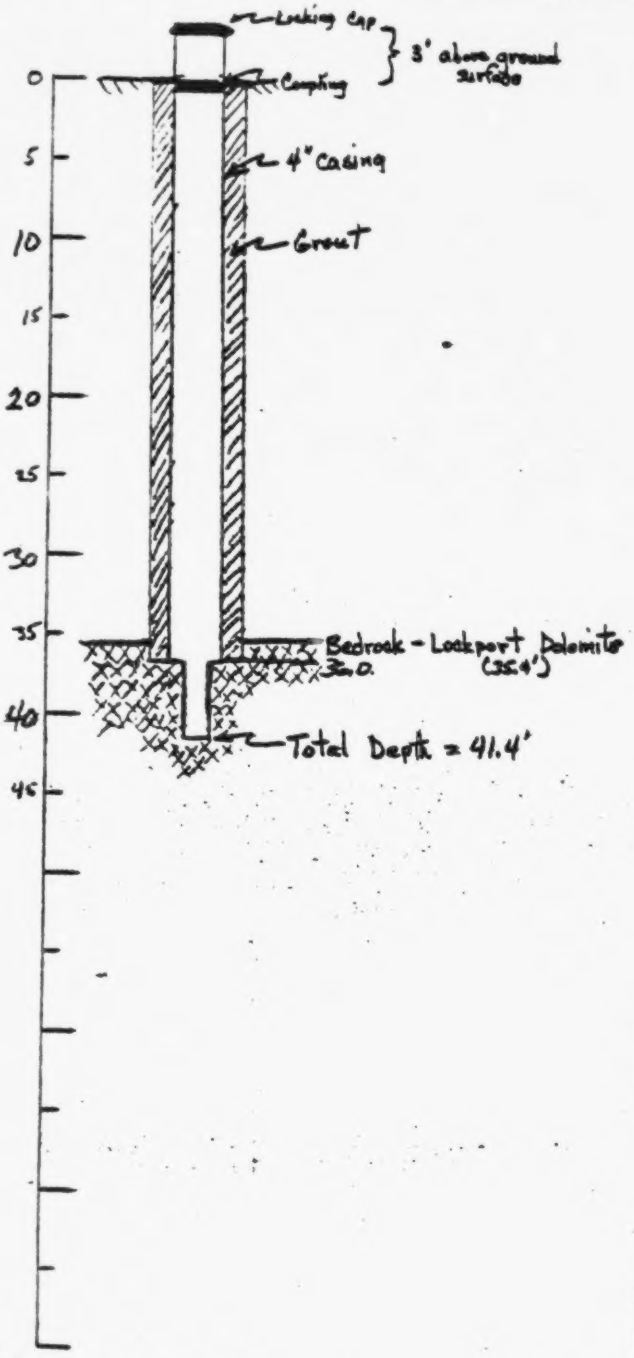
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Tom Bolyard

Well No. 84-B

Project Love Canal

Location Directly in front of house #973 on 97th St.

Prepared By: Tom Bolyard

Scale: 1"=10'

Date 10/1/80

WELL LOG

PROFILE	DESCRIPTION
0	Light brown silty sand, dry
4.5'	Grayish brown silty clay, slightly moist and cohesive, gray silty partings
6.5'	Reddish brown silty clay, very moist and cohesive
26.5'	Till
28'	

PROJECT Love Canal
OWNER State of New York
WELL NO. 85-A
LOCATION 911 97th St. - directly in front of house

	Date	Time
DRILLING STARTED	10/2/80	1615
DRILLING COMPLETED	10/3/80	0910

DRILLER Mike Warner
GEOLOGIST Tom Bolyard
RIG TYPE CME-55
REFERENCE POINT ground surface
R.P. ELEVATION not yet surveyed 573.2
TOPO POSITION flat lying
PROFILE BY Tom Bolyard
FIELD BOOK NO. 6 PAGES 93-95

WELL DATA

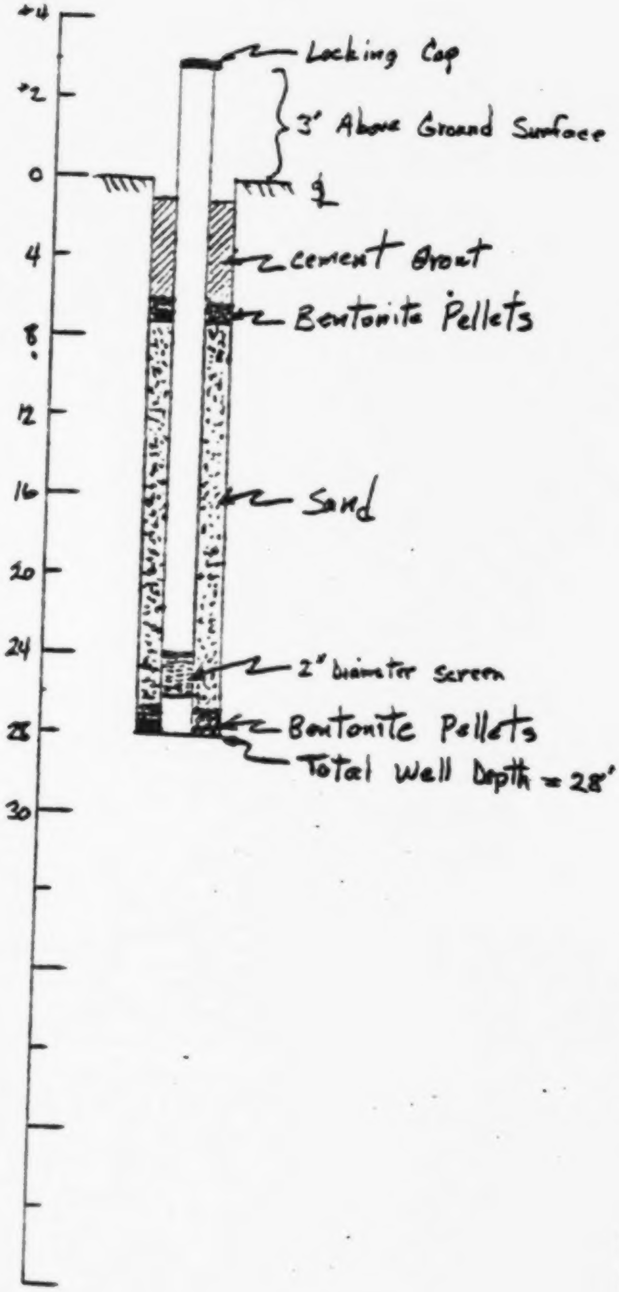
HOLE DIAMETER 7"
HOLE DEPTH 28'
CASING DIAMETER 2"
CASING LENGTH 31'
SCREEN DIAMETER 2"
SCREEN SETTING 24'-26' below ground level
SCREEN SLOT/TYPE .0001 stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 10/4/80 @ 1110
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Seitings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Tom Bolyard

Well No. 85-A

Project Love Canal

Location Directly in front of house #911 on 97th St.

Date 10/3/80

Prepared By: Tom Bolyard

Scale: 1"=4'

WELL LOG

PROFILE	DESCRIPTION
0	Light brown silty sand, dry, contains many small rounded pebbles
4.5'	Grayish brown silty clay, slightly moist & cohesive; gray silty partings; contains fine sand
7'	Reddish brown silty clay; very moist and cohesive
8'	Grayish black clayey material with sand, moist, organic odor
9'	Reddish brown silty clay, very moist and cohesive
26.5'	Till
35.6'	Bedrock - Lockport Dolomite

PROJECT Love Canal
OWNER State of New York
WELL NO. 85-B
LOCATION 911 97th St. - directly in front of house

	Date	Time
DRILLING STARTED	10/1/80	1515
DRILLING COMPLETED	10/4/80	0915

DRILLER Mike Warner
GEOLOGIST Tom Bolyard
RIG TYPE CME-55
REFERENCE POINT ground surface
R.P. ELEVATION not yet surveyed 573.2
TOPO POSITION flat lying
PROFILE BY Tom Bolyard
FIELD BOOK NO. 6 PAGES 91-94, 98-100

WELL DATA

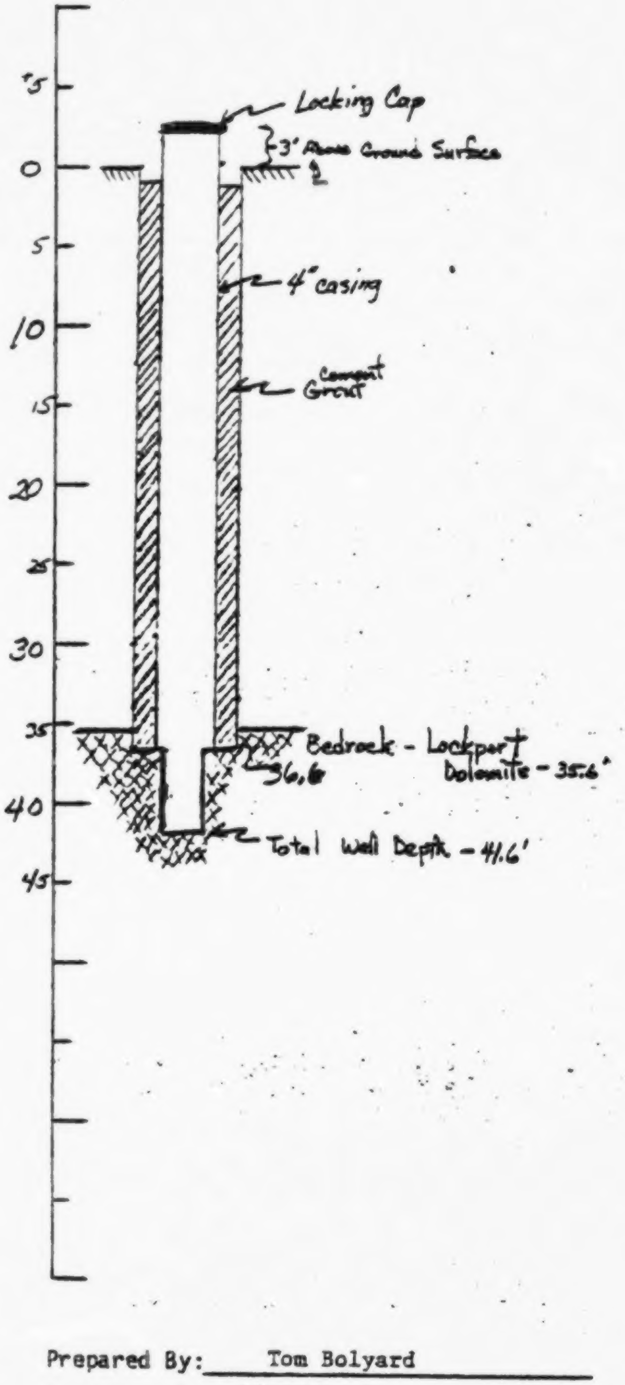
HOLE DIAMETER 7"
HOLE DEPTH 41.6'
CASING DIAMETER 4"
CASING LENGTH 39.6'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
DEPTH TO BEDROCK 35.6'

PUMP TEST DATA

STATIC DEPTH TO WATER 11.12'
DATE MEASURED 10/4/80 @ 1113
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Mike Warner
Supervisory Geologist Tom Bolyard

Well No. 85-B
Project Love Canal
Location Directly in front of house #911 on 97th St.

Date 10/2/80

Prepared By: Tom Bolyard
Scale: 1"=10'

WELL LOG

FEET BLS	PROFILE	DESCRIPTION
0	TOPSOIL - - - 0.5'	DARK BROWN LOAM
	Clayey Silt	Variegated clayey silt; layers are medium to light gray, predominately with some light brown and reddish brown stringers
5	- - - - - - 6'	
10	Silty Clay	medium brown to reddish brown silty clay at the top, tan to medium brown in the middle and [illegible] reddish brown at the bottom
15	- - - - - - - 14.5'	
20	Red Sticky Clay	Reddish brown, wet, sticky, clay with stringers of silt.
	- - - - - - - 22.5'	
25	Till	Soft reddish clay till to about 27.5' BLS over a hard dry reddish brown till

Bottom of hole is 24 feet BLS

1 inch = 5 feet Below land surface (BLS)

PROJECT Love Canal

OWNER State of New York

WELL NO. 86-A

LOCATION 745 97th St.

	Date	Time
DRILLING STARTED	9/23/80	1405
DRILLING COMPLETED	9/23/80	1600

DRILLER Joe Jensen

GEOLOGIST Charlie Kufs

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION 574.0

TOPO POSITION flat lying lacustrian plain

PROFILE BY Charlie Kufs

FIELD BOOK NO. 3 PAGES 45-46

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 24'

CASING DIAMETER 2"

CASING LENGTH 20', 2' screen, 2' sump

SCREEN DIAMETER 2"

SCREEN SETTING 20'-22' BLS

SCREEN SLOT/TYPE 10 slot/ stainless steel
.0001 stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/23/80 @ 1625 (on completion of well

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

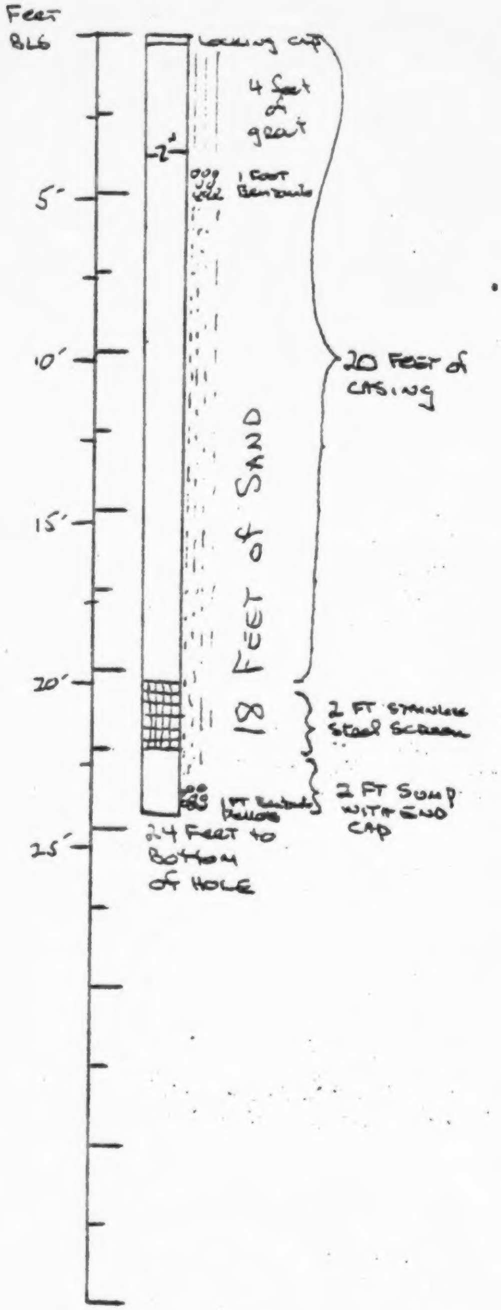
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S 2"BLS
Total Depth 24'
Borehole Diameter 6"
Casing Diameter 2"
Casing Thickness single wall
Casing Lengths 22'
Screen Data
- Material Stainless steel
- Diameter 2"
- Slot Openings 10 slot
- Seitings 20'-22' BLS

Centralizers none
Grout Type Portland Cement
Gravel Pack #4 Sand
K-Fittings none
Packers none
Cement Baskets none

Rig Type CME-55
Driller Joe Jensen
Supervisory Geologist Charlie Kufs

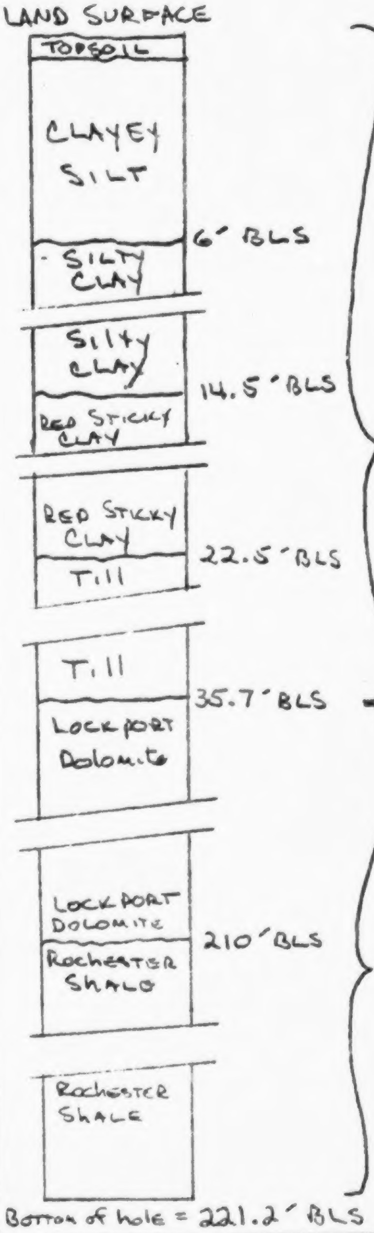
Well No. 86-A
Project Love Canal
Location 745 97th St.

Prepared By: Charlie Kufs
Scale: 1"=5'

Date 9/23/80

WELL LOG

PROFILE DESCRIPTION



FOR THE Description of the overburden See the Well Log for Well 86 A

FOR THE DESCRIPTION of The Bedrock See the Bedrock Core Log for well 86 C

PROJECT Love Canal

OWNER State of New York

WELL NO. 86-B/C

LOCATION 745 97th St.

	Date	Time
DRILLING STARTED	9/23/80	0740
DRILLING COMPLETED	9/29/80	0825

DRILLER Joe Jensen

GEOLOGIST Charlie Kufs

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed

TOPO POSITION flat lying lacustrian plain

PROFILE BY C. Kufs

FIELD BOOK NO. 3 PAGES 44-69

WELL DATA

HOLE DIAMETER 6" to 35.7'BLS; 2 15/16 in rock

HOLE DEPTH B: 41.3'BLS C: 221.2'

CASING DIAMETER 4" to 35.7'BLS; open hole in rock

CASING LENGTH 35.7'

SCREEN DIAMETER none

SCREEN SETTING none

SCREEN SLOT/TYPE none

DEPTH TO BEDROCK 35.7'

PUMP TEST DATA

STATIC DEPTH TO WATER 9.2'BLS

DATE MEASURED 9/29/80 @ 0715

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

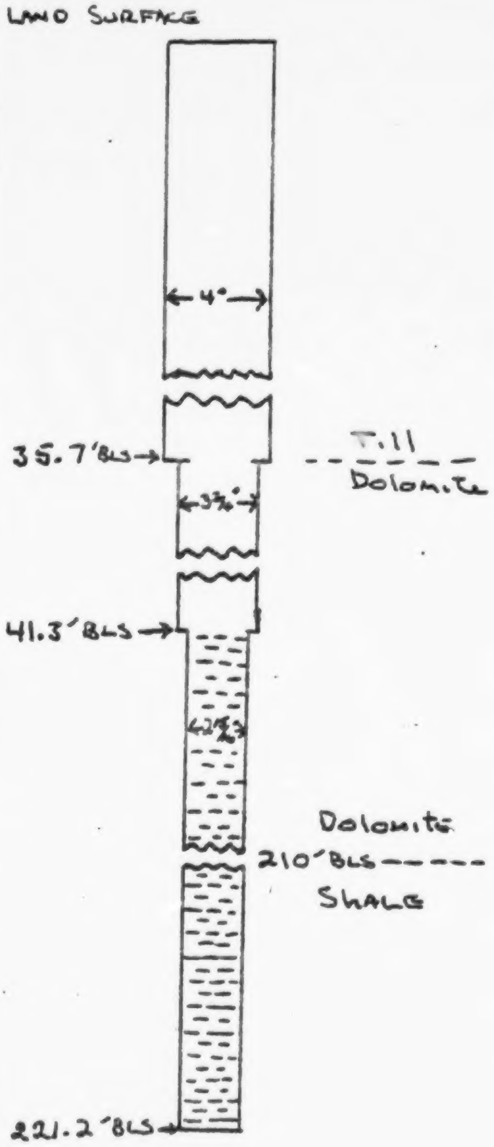
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Water level measured on completion of the well.

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55
Driller Joe Jensen
Supervisory Geologist Charlie Kufs

Well No. 86-Ⓑ/C
Project Love Canal
Location 745 97th St.

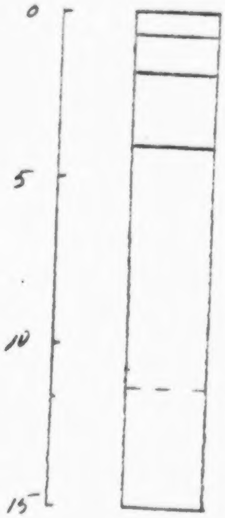
Prepared By: C. Kufs
Scale: 1"=5'

Date 9/29/80

WELL LOG

PROFILE

DESCRIPTION



Dark gray to black topsoil

light brown loam

Darker brown sandy Clay

Reddish brown Clay

zone of saturation 11'

PROJECT Love Canal

OWNER State of New York

WELL NO. 87-A

LOCATION 718 99th St.

	Date	Time
DRILLING STARTED	10/4/80	1115
DRILLING COMPLETED	10/4/80	1300

DRILLER Ron Bush

GEOLOGIST Tom Farmer

RIG TYPE CME-55

REFERENCE POINT ground surface

R.P. ELEVATION not yet surveyed 574

TOPO POSITION flat

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 PAGES 25

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 15'

CASING DIAMETER 2"

CASING LENGTH 18.2'

SCREEN DIAMETER 2"

SCREEN SETTING 11'-13'

SCREEN SLOT/TYPE 100/stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/4/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

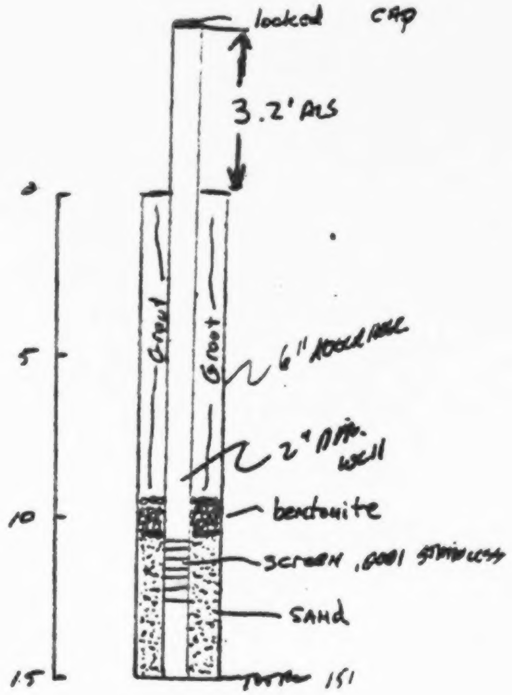
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Tom Farmer

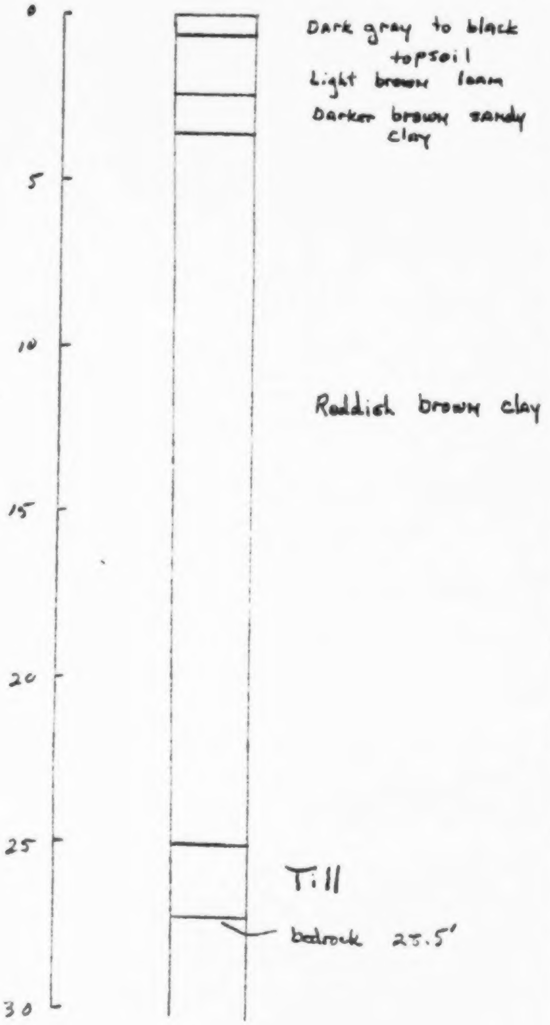
Well No. 87-A
Project Love Canal
Location 718 99th St.

Date 10/10/80

Prepared By: Tom Farmer
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER State of New York

WELL NO. 87-B

LOCATION 718 99th St.

	Date	Time
DRILLING STARTED	10/3/80	1245
DRILLING COMPLETED	10/7/80	1015

DRILLER Ron Bush

GEOLOGIST Tom Farmer

RIG TYPE CME-55

REFERENCE POINT ground surface

R.P. ELEVATION not yet surveyed 574

TOPO POSITION flat

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 PAGES 24-25,35-36

WELL DATA

HOLE DIAMETER 6" - 2 15/16

HOLE DEPTH 35.2' - Total

CASING DIAMETER 4"

CASING LENGTH 34'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 28.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 8.76'

DATE MEASURED 10/7/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

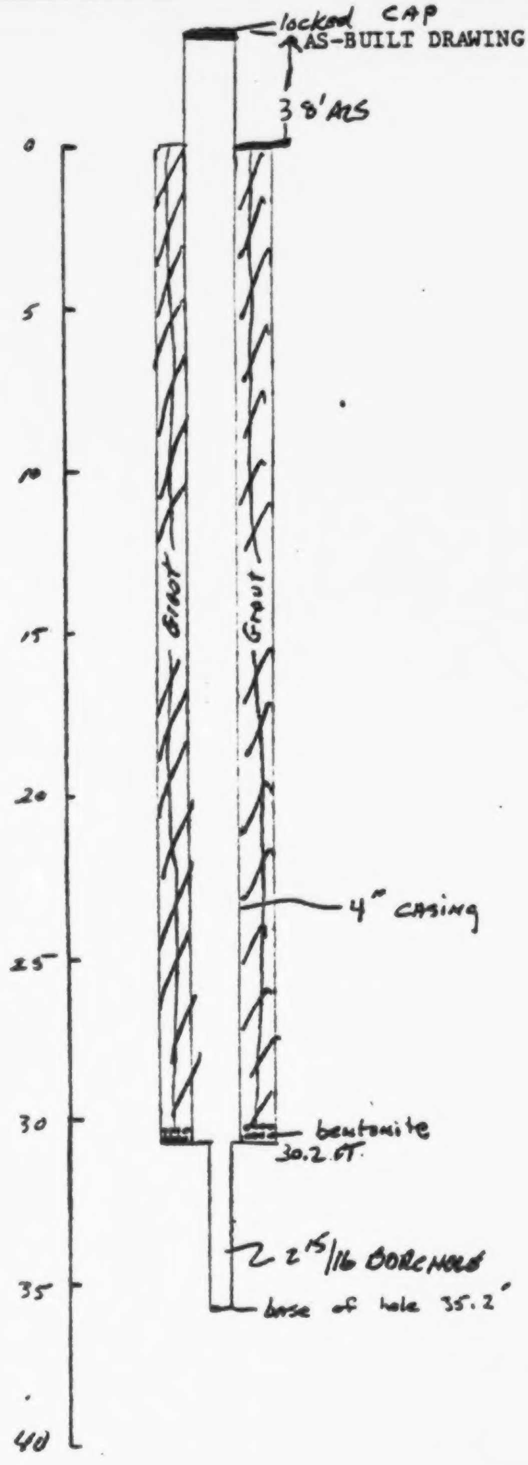
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Tom Farmer

Well No. 87-B
Project Love Canal
Location 718 99th St.

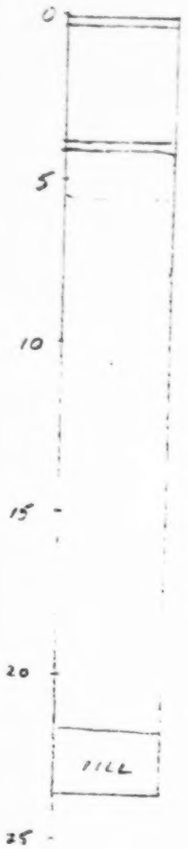
Prepared By: Tom Farmer
Scale: 1"=5'

Date 10/10/80

WELL LOG

PROFILE

DESCRIPTION



TOPSOIL

YEL-BRN SILTY CLAY

VERY SILTY YEL-BRN CLAY, DRY

SILTY LAYER

FIRM

MOIST

RED-BRN AND GRAY-BRN CLAY

MOIST, INTACT

MOISTURE

STICKY

VERY STICKY

DRY TILL

SCALE: 1" = 5'

PROJECT Love Canal

OWNER State of New York

WELL NO. 88-A

LOCATION 507 99th St.

	Date	Time
DRILLING STARTED	10/4/80	0753
DRILLING COMPLETED	10/4/80	1130

DRILLER Joe Genovese

GEOLOGIST Dave Conover

RIG TYPE CME-45

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 574.0

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 66,67

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 23.5'

CASING DIAMETER 2" ID

CASING LENGTH 26.5

SCREEN DIAMETER 2"

SCREEN SETTING 10.5' - 21.5'

SCREEN SLOT/TYPE stainless, .0001 horz. slot

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/4/80 @ 1138

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

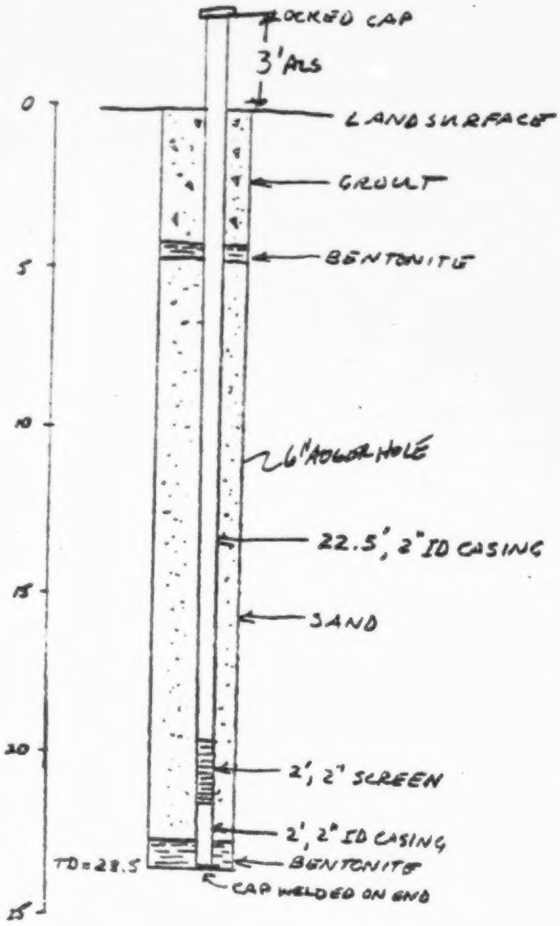
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45
Driller Joe Genovese
Supervisory Geologist Dave Conover

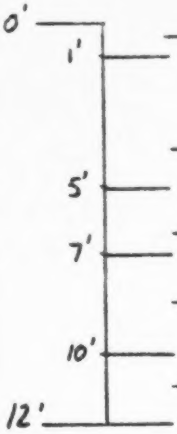
Well No. 88-A
Project Love Canal
Location 507 99th St.

Date 10/4/80

Prepared By: Dave Conover
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



SOIL - VEGETATION

YELLOW LOAM - DRY WITH ROOTS.

SANDY CLAY - RED WITH GREY MOTTLED. MOIST

SILTY CLAY - RED WITH GREY MOTTLING. - MOIST.

SANDY CLAY - RED MOIST

PROJECT Love Canal
OWNER State of New York
WELL NO. 89-A
LOCATION 460 99th St.

	Date	Time
DRILLING STARTED	10/2/80	1538
DRILLING COMPLETED	10/2/80	1610

DRILLER Roger Logel
GEOLOGIST Ed Tokarski
RIG TYPE CME-45C
REFERENCE POINT land surface
R.P. ELEVATION not surveyed 574.7
TOPO POSITION flat lying
PROFILE BY Ed Tokarski
FIELD BOOK NO. 10 PAGES 44-47

WELL DATA

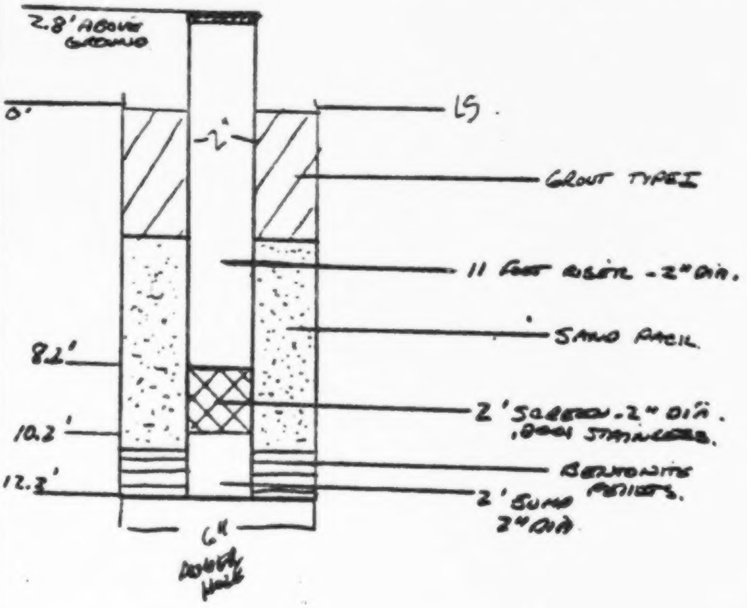
HOLE DIAMETER 6"
HOLE DEPTH 12.2'
CASING DIAMETER 2"
CASING LENGTH 15'
SCREEN DIAMETER 2"
SCREEN SETTING 8.2'-10.2'
SCREEN SLOT/TYPE .0001" Stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 10/2/80 @ 1610
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory Geologist Ed Tokarski

Well No. 89-A

Project Love Canal

Location 460 99th St.

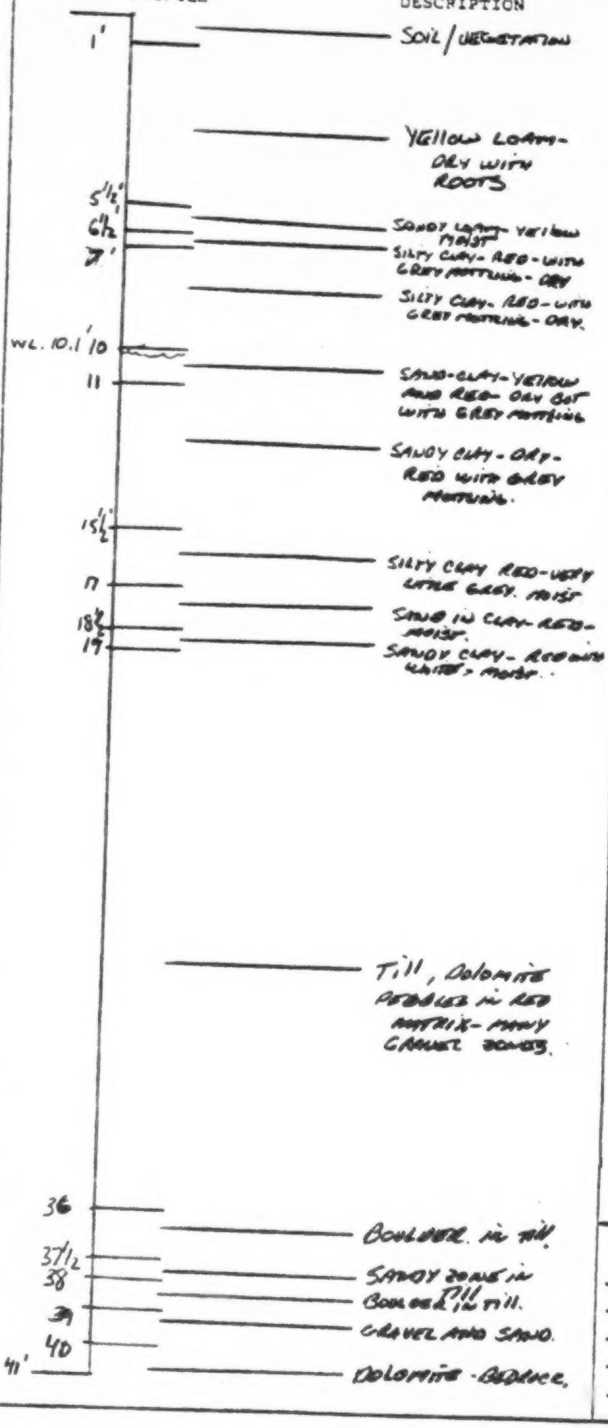
Prepared By: Ed Tokarski

Scale: 1"=5'

Date 10/2/80

WELL LOG

PROFILE



DESCRIPTION

SOIL / VEGETATION

YELLOW LOAM - DRY WITH ROOTS

SANDY LOAM - YELLOW MOIST

SILTY CLAY - RED - WITH GREY MOTTLING - DRY

SILTY CLAY - RED - WITH GREY MOTTLING - DRY.

SAND - CLAY - YELLOW AND RED - DRY BUT WITH GREY MOTTLING

SANDY CLAY - DRY - RED WITH GREY MOTTLING.

SILTY CLAY RED - VERY LITTLE GREY. MOIST

SAND IN CLAY - RED - MOIST.

SANDY CLAY - RED WITH WHITE, MOIST.

Till, Dolomite PEBBLES in RED MATRIX - MANY GRAVEL ZONES.

BOULDER in TILL.

SANDY ZONE in TILL

BOULDER in TILL.

GRAVEL AND SAND.

DOLOMITE - BEDROCK.

PROJECT Love Canal

OWNER State of New York

WELL NO. 89-B

LOCATION 460 99th St.

	Date	Time
DRILLING STARTED	10/1/80	0900
DRILLING COMPLETED	10/6/80	0931

DRILLER Roger Logel

GEOLOGIST Ed Tokarski

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION not yet surveyed 574.7

TOPO POSITION flat lying

PROFILE BY Ed Tokarski

FIELD BOOK NO. 10 PAGES 44-50,58-59

WELL DATA

HOLE DIAMETER 6" - 2 15/16

HOLE DEPTH 43.3' -

CASING DIAMETER 4"

CASING LENGTH 43.2'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 40.0' BLS

PUMP TEST DATA

STATIC DEPTH TO WATER 10.11'

DATE MEASURED 10/6/80@ 1019

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

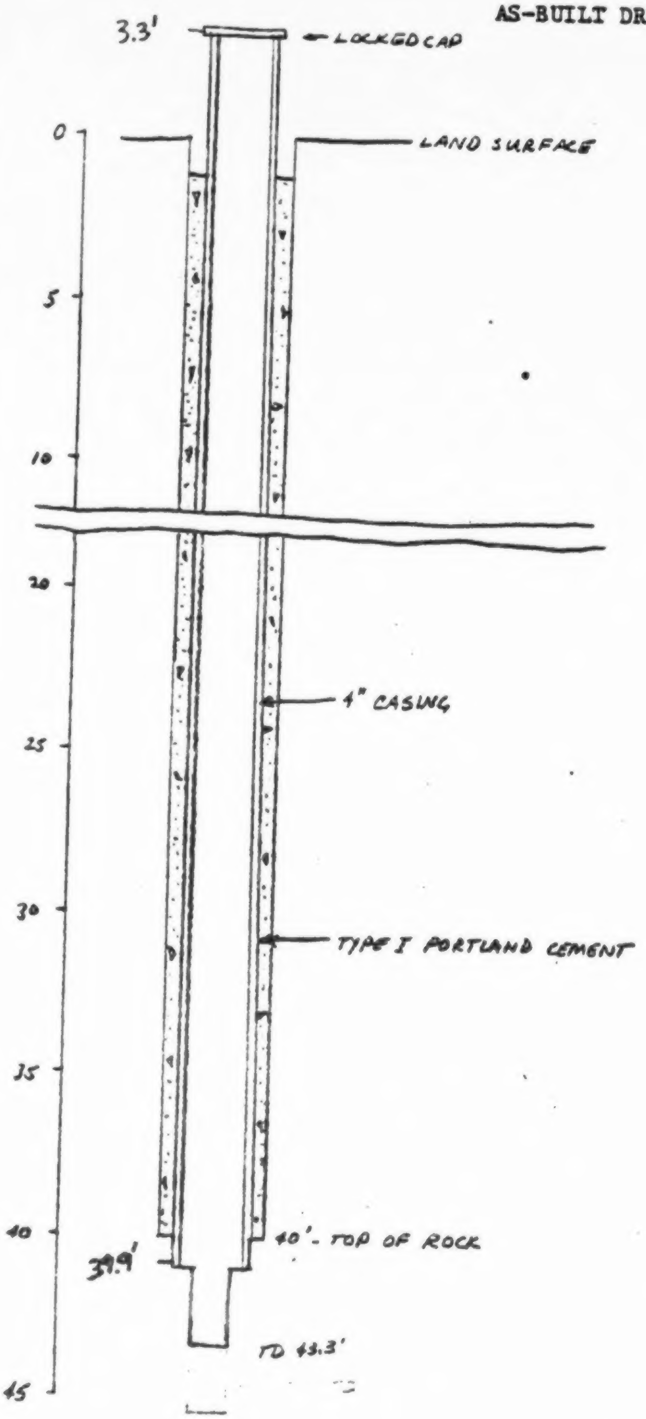
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Original 89B hole grouted up due to rejection from boulder at 22'. Profiles for 89B holes were the same.

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45C
Driller Roger Logel
Supervisory Geologist Ed Tokarski

Well No. 89-B
Project Love Canal
Location 460 99th St.

Date 10/2/80

Prepared By: Ed Tokarski
Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
0	
	BLACK SAND/ASH AND SILTY CLAY WITH GRAVEL
2.5'	
	YELLOW BROWN SILTY CLAY
4'	
	YELLOWISH REDDISH BROWN SILTY CLAY
6.5'	
	REDDISH BROWN SILTY CLAY
9'	
	REDDISH GRAY CLAY
11'	
12'	GRAY BROWN CLAY
	REDDISH GRAYISH BROWN CLAY MOIST PLASTIC
20.5'	
	REDDISH BROWN TILL PEBBLES
22.5'	

PROJECT Love Canal

OWNER United Methodist Church

WELL NO. 90-A

LOCATION 9610 Colvin Blvd. - back of parking lot near 97th St.

	Date	Time
DRILLING STARTED	9/24/80	1438
DRILLING COMPLETED	9/24/80	1620

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573.1'

TOPO POSITION flat

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 77-78

WELL DATA

HOLE DIAMETER 6.5"

HOLE DEPTH 22.5'

CASING DIAMETER 2"

CASING LENGTH 21.5'

SCREEN DIAMETER 2"

SCREEN SETTING 20.5'-18.5'

SCREEN SLOT/TYPE .001" Johnson stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 9/24/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

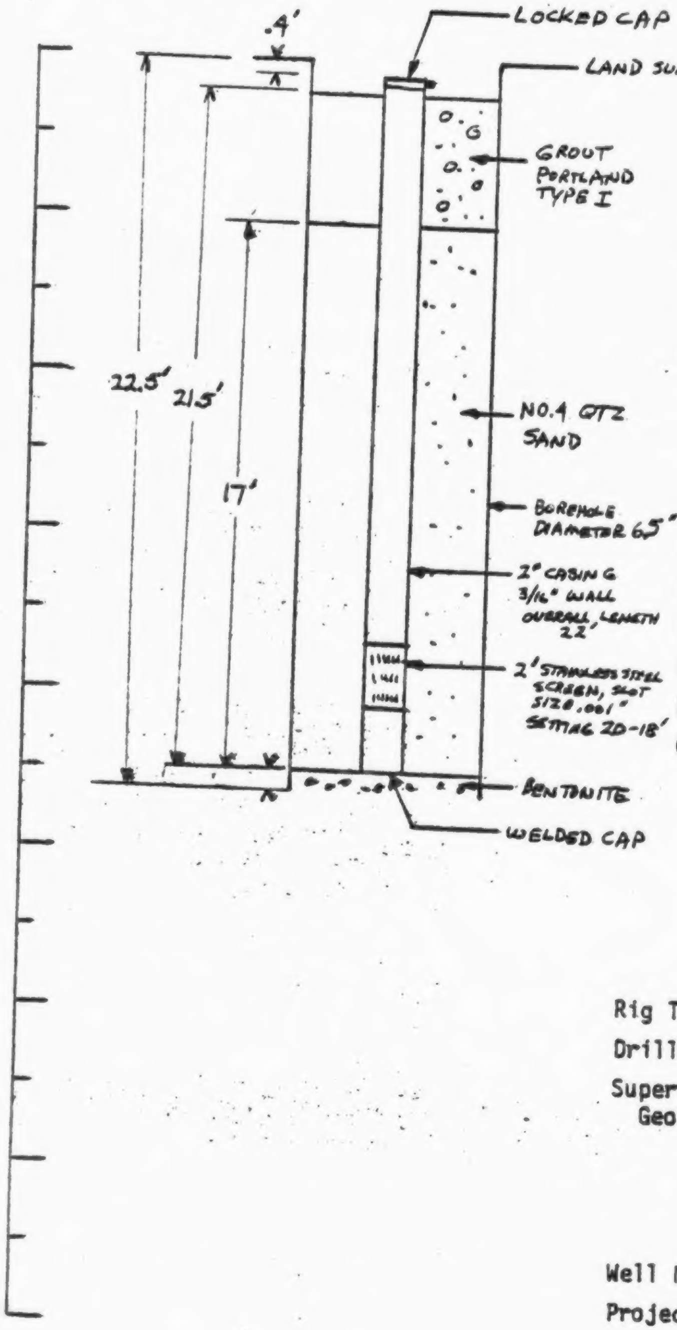
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist Dennis Stanczuk

Well No. 90-A
Project Love Canal
Location 9610 Colvin Blvd. - back of parking lot near 97th St.
Date 9/24/80

Prepared By: Dennis Stanczuk
Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
0	
	BLACK SAND + SILTY CLAY WITH GRAVEL
2.5'	
	YELLOW BROWN SILTY CLAY MOIST PLASTIC
4'	
	YELLOWISH REDDISH BROWN SILTY CLAY
7'	
	REDDISH BROWN SILTY CLAY MOIST
9'	
	REDDISH GRAY BROWN SILTY CLAY MOIST PLASTIC
20.5'	
	REDDISH BROWN SILTY TILL WITH PEBBLES, SOFT
22.0'	
	HARD TILL
28'	
	WET TILL
30.5'	
	DOLOMITE
35.5'	

PROJECT Love Canal

OWNER United Methodist Church

WELL NO. 90-B

LOCATION 9610 Colvin Blvd. - back of parking lot near 97th St.

	Date	Time
DRILLING STARTED	9/24/80	0930
DRILLING COMPLETED	9/27/80	1300

DRILLER Ed Cole

GEOLOGIST Dennis Stanczuk

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION not surveyed 573.1

TOPO POSITION flat

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 74-76 85-86

WELL DATA

HOLE DIAMETER 6.5" auger / 2 15.16 Tricone

HOLE DEPTH 30.5'/35.5'

CASING DIAMETER 4"

CASING LENGTH 30'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 30.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 29.1'

DATE MEASURED 9/24/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

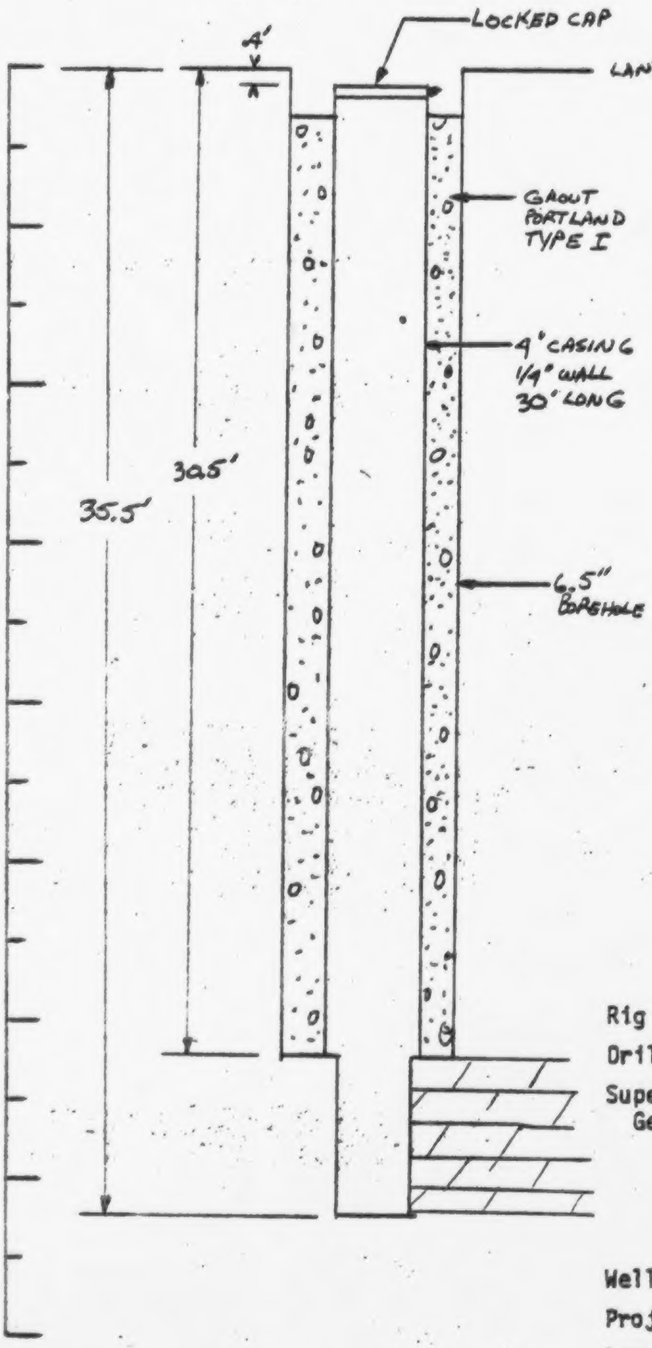
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Seitings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type a Acker AD-2

Driller Ed Cole

Supervisory Geologist Dennis Stanczuk

Well No. 90-B

Project Love Canal

Location 9610 Colvin Blvd. - back of parking lot near 97th St.

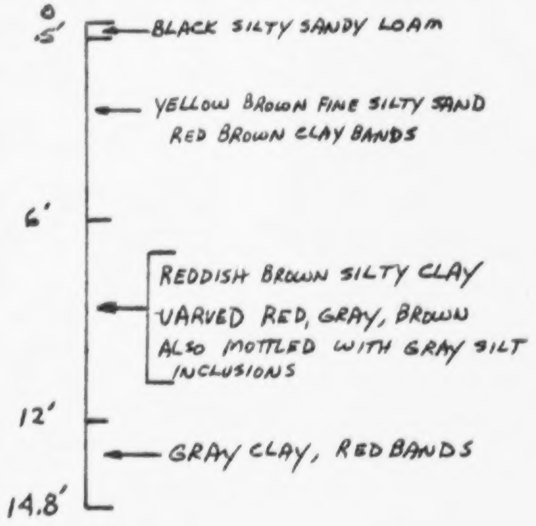
Prepared By: Dennis Stanczuk

Scale: 1"=5'

Date 9/27/80

WELL LOG

PROFILE DESCRIPTION



PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 96-A

LOCATION Buffalo Ave., between 10002 and 9922 along city sewer

	Date	Time
DRILLING STARTED	10/8/80	0830
DRILLING COMPLETED	10/8/80	1130

DRILLER Mike Warner

GEOLOGIST Dennis Stanczuk

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION 574.1

TOPO POSITION flat

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 **PAGES** 94-96

WELL DATA

HOLE DIAMETER 6.5"

HOLE DEPTH 14.8'

CASING DIAMETER 2"

CASING LENGTH 14.3'

SCREEN DIAMETER 2"

SCREEN SETTING 12.6'-10.6'

SCREEN SLOT/TYPE 10 slot stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/8/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

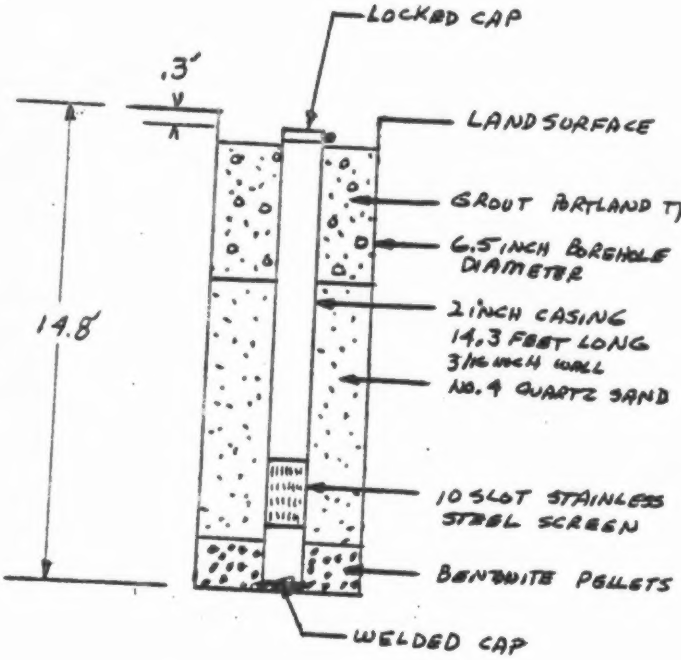
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Screen set just below bottom of city sewer which is 10'. The sewer is about 10' from the hole. Log drawn from continuous split-spoon samples.

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dennis Stanczuk

Well No. 96-A

Project Love Canal

Location Buffalo Ave. between 10002 and 9922 along city sewer

Date 10/8/80

Prepared By: Dennis Stanczuk

Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
	BLACK SANDY SILTY LOAM
1.5'	
	YELLOW BROWN FINE SAND SILT DRY
4.5'	
	YELLOW BROWN SILT CLAY
6'	
	REDDISH BROWN SILTY CLAY
7'	
	REDDISH BROWN CLAY
11'	
	REDDISH GRAY CLAY VERY SOFT, PLASTIC
35.5'	
	TILL, GRAVEL
42.6'	
	DOLOMITE
48.2'	

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 96-B

LOCATION Buffalo Ave., between 10002 and 9922 along city sewer line (15')

	Date	Time
DRILLING STARTED	10/6/80	1450
DRILLING COMPLETED	10/11/80	1430

DRILLER Mike Warner

GEOLOGIST Dennis Stanczuk

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION 574.1

TOPO POSITION flat

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 90-93,105

WELL DATA

HOLE DIAMETER 6.5"/2 15/16"

HOLE DEPTH 42.6'/ 48.2'

CASING DIAMETER 4"

CASING LENGTH 43'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 42.6'

PUMP TEST DATA

STATIC DEPTH TO WATER 15.1' after augers were pulled

DATE MEASURED 10/7/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

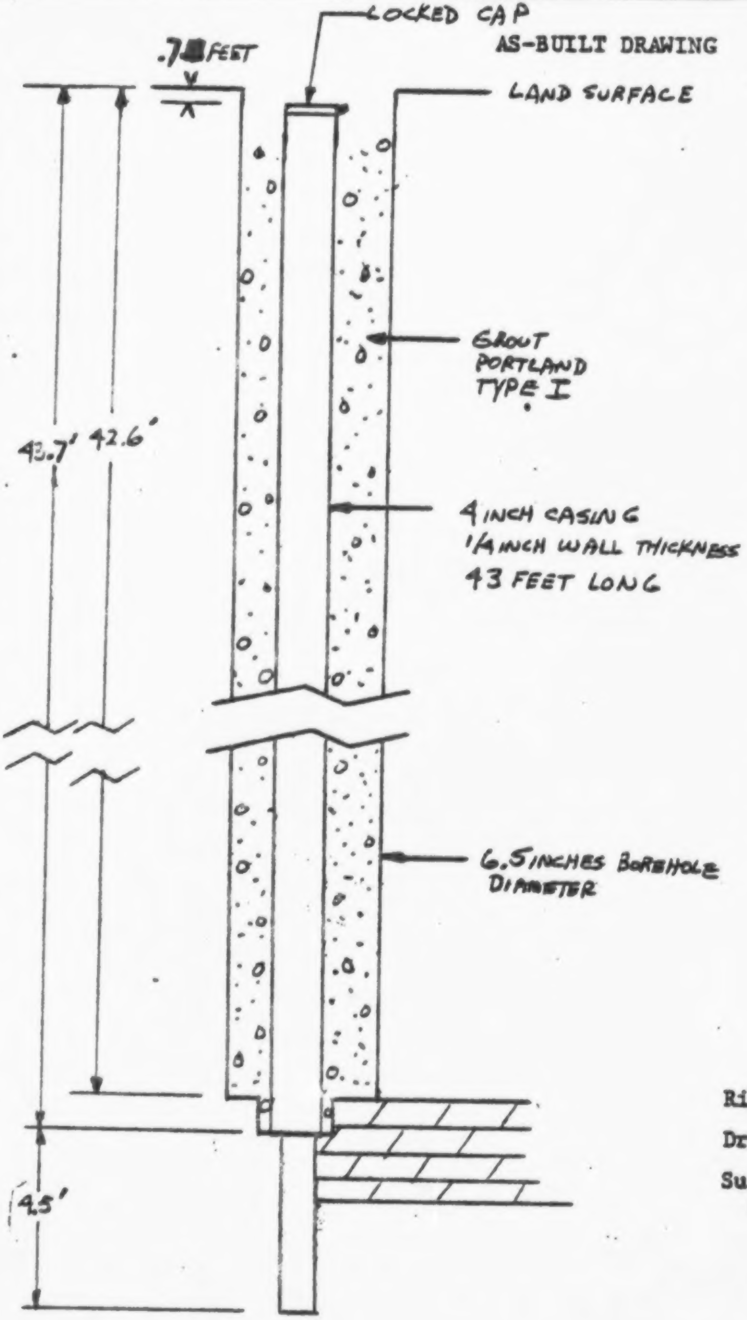
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dennis Stanczuk

Well No. 96-B

Project Love Canal

Location Buffalo Ave. between 10002 and 9922 along city sewer line (15')

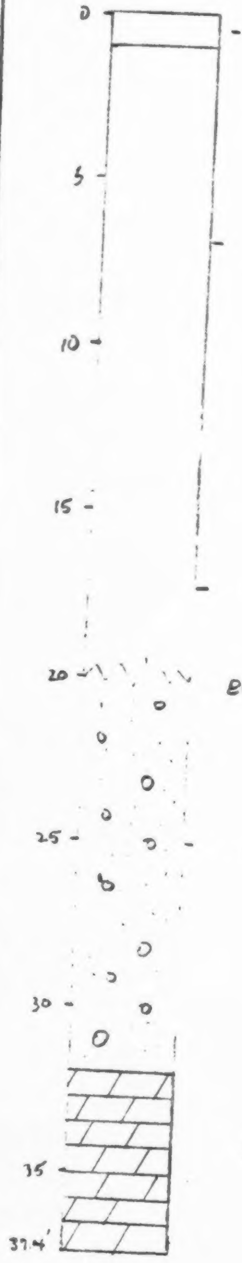
Date 10/11/80

Prepared By: Dennis Stanczuk

Scale: 1"=5'

WELL LOG

PROFILE **DESCRIPTION**



- TOPSOIL

- SANDY CLAY TOP, GRADING TO WET CLAY BOTTOM

- SOFT CLAY

BOUNDARY INDISTINCT

TILL

DOLOMITE

SCALE: 1" = 5'

PROJECT LOVE CANAL

OWNER CITY OF NIAGRA FALLS

WELL NO. 98B

LOCATION EAST END OF JAYNE PARK

	Date	Time
DRILLING STARTED	10/16/80	0847
DRILLING COMPLETED	10/17/80	1403

DRILLER JOE JENSEN

GEOLOGIST DAVE CONOVER

RIG TYPE CME-55

REFERENCE POINT LAND SURFACE

R.P. ELEVATION 568.0

TOPO POSITION FLAT-LYING

PROFILE BY DAVE CONOVER

FIELD BOOK NO. 8 & 4 **PAGES** 88-89-53

WELL DATA

HOLE DIAMETER 6", 3" 52.2'

HOLE DEPTH 6"; 32.2', 3"; 37.4

CASING DIAMETER 4"

CASING LENGTH 32.6'

SCREEN DIAMETER NONE USED

SCREEN SETTING

SCREEN SLOT/TYPE

PUMP TEST DATA

STATIC DEPTH TO WATER 3.30' BLS

DATE MEASURED 10/17/80 1405

PUMPING DEPTH TO WATER NOT TESTED

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

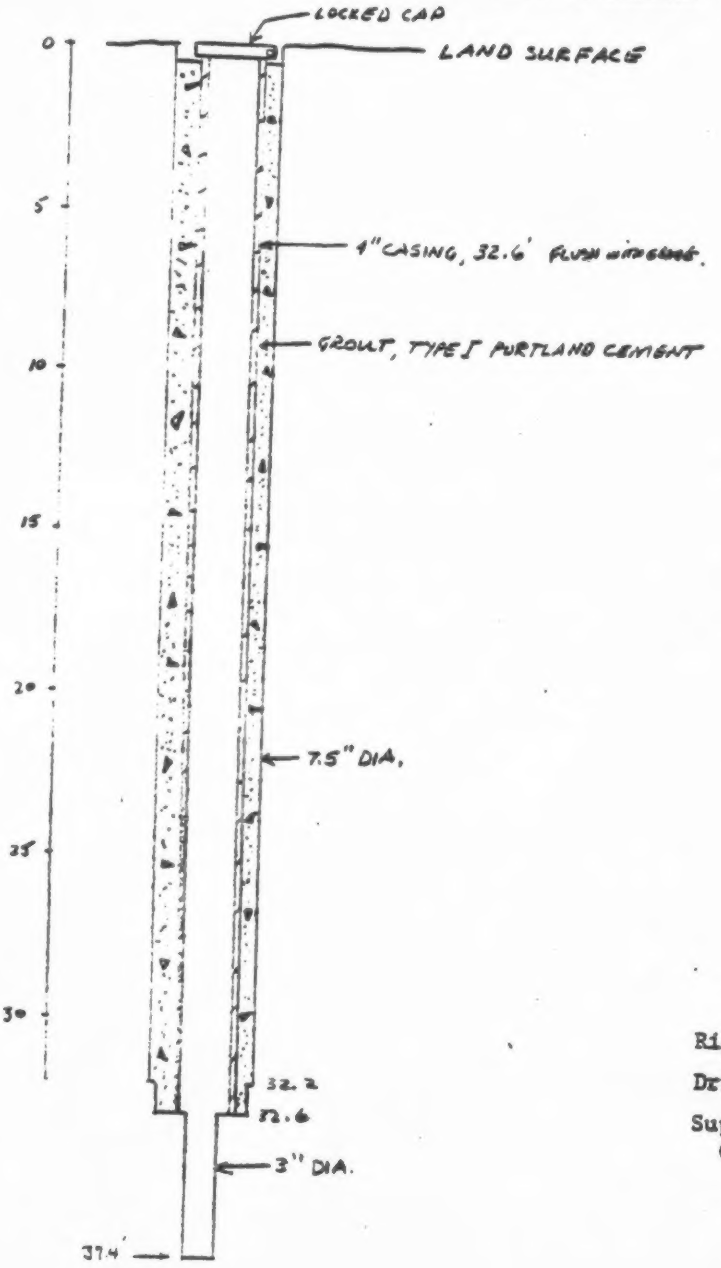
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

WET HOLE FROM 2' - UNABLE TO DISTINGUISH SOIL ZONES FROM AUGER CUTTINGS.

AS-BUILT DRAWING


LOCKED CAP
LAND SURFACE
4" CASING, 32.6' FLUSH WITH GRADE.
GROUT, TYPE I PORTLAND CEMENT
7.5" DIA.
3" DIA.
0
5
10
15
20
25
30
32.2
32.6
37.4'

CHECKLIST

Land Surface Elevation

Casing Height Above L-S

Total Depth

Borehole Diameter

Casing Diameter

Casing Thickness

Casing Lengths

Screen Data

- Material
- Diameter
- Slot Openings
- Settings

Centralizers

Grout Type

Gravel Pack

K-Fittings

Packers

Cement Baskets

Rig Type CME-55

Driller JOE JENSEN

Supervisory Geologist DAVE CONOVER

Well No. 98B

Project LOVE CANAL

Location EAST END OF JAYNE PARK

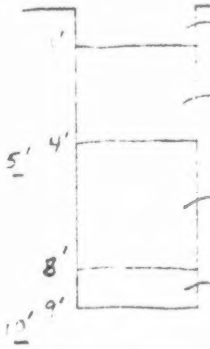
Prepared By: DAVE CONOVER

Scale: 1" = 5'

Date OCTOBER 17,1980

WELL LOG

PROFILE	DESCRIPTION



Loam, dark brown with stones

Loam, grey silty with stones

Silt, grey to black with Organic smell

Clay, brown to red brown silty, slightly moist

PROJECT	Love Canal
OWNER	City of Niagara Falls
WELL NO.	99-A
LOCATION	Buffalo Ave. & Cayuga Dr., south of expressway off ramp

	Date	Time
DRILLING STARTED	10/14/80	1015
DRILLING COMPLETED	10/14/80	1031

DRILLER	Ed Cole
GEOLOGIST	David Robertson
RIG TYPE	Acker AD-2
REFERENCE POINT	land surface
R.P. ELEVATION	576.0
TOPO POSITION	flat lying
PROFILE BY	David Robertson
FIELD BOOK NO.	5
PAGES	114-115

WELL DATA

HOLE DIAMETER	6"
HOLE DEPTH	9'
CASING DIAMETER	2"
CASING LENGTH	8.5'
SCREEN DIAMETER	2"
SCREEN SETTING	7'-5'
SCREEN SLOT/TYPE	10 slot/stainless steel

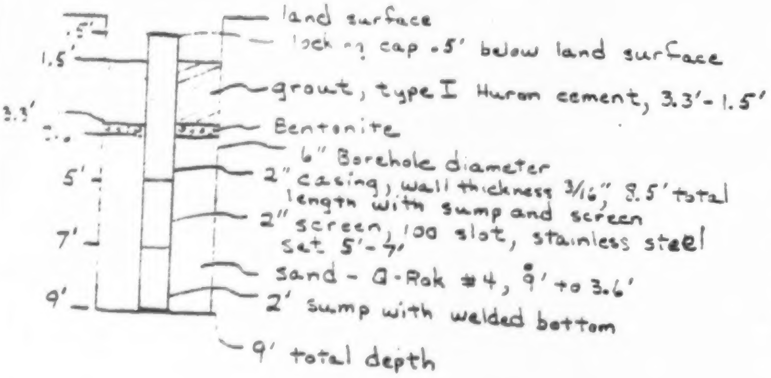
PUMP TEST DATA

STATIC DEPTH TO WATER	Dry hole
DATE MEASURED	10/14/80 @ 1153
PUMPING DEPTH TO WATER	
TEST DURATION	
PUMPING RATE	
TEST DATE	
TEST TYPE	
PUMP SETTING	
SPECIFIC CAPACITY	

REMARKS

Finished well with locking cap, concrete vault and top

AS-BUILT DRAWING


.5'
1.5'
3.3'
5'
7'
9'
land surface
locking cap .5' below land surface
grout, type I Huron cement, 3.3'-1.5'
Bentonite
6" Borehole diameter
2" casing, wall thickness 3/16", 8.5' total length with sump and screen
2" screen, 100 slot, stainless steel set 5'-7'
sand - Q-Rok #4, 9' to 3.6'
2' sump with welded bottom
9' total depth

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 99-A

Project Love Canal

Location Buffalo Ave. & Cayuga Dr. south of expressway off ramp

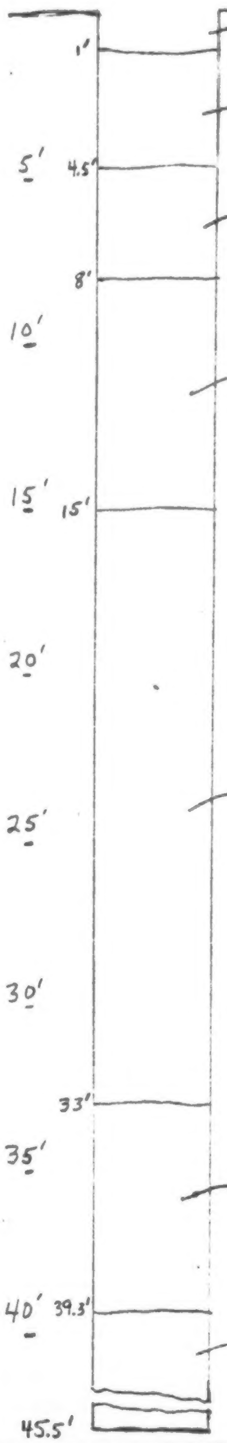
Date 10/14/80

Prepared By: David Robertson

Scale: 1"=5'

WELL LOG

PROFILE **DESCRIPTION**



Loam - dark brown, stones and pebbles interspersed

Fill - grey silt with stones and pebbles

Silt - grey to dark grey, organic peat-like smell

Clay, Brown, silty, slightly moist, some red to red brown clay interspersed

Clay - brown to grey brown, moist to wet with depth, sticky

Till

Lockport Dolomite

45.5 total depth

PROJECT Love Canal

OWNER City of Niagara Falls.

WELL NO. 99-B

LOCATION Buffalo Ave. & Cayuga Dr. south of expressway off ramp

	Date	Time
DRILLING STARTED	10/13/80	0950
DRILLING COMPLETED	10/15/80	1338

DRILLER Ed Cole

GEOLOGIST David Robertson

RIG TYPE Acker AD-2

REFERENCE POINT ground level

R.P. ELEVATION 576.0

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 5 **PAGES** 112-115

WELL DATA

HOLE DIAMETER 6" - 2 15/16

HOLE DEPTH 45.5' - Total

CASING DIAMETER 4"

CASING LENGTH 40'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 39.3'

PUMP TEST DATA

STATIC DEPTH TO WATER 11.65' below ground level

DATE MEASURED 10/15/80 @ 1401

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Well finished with locking cap and vault

WELL LOG

PROFILE	DESCRIPTION
0	Light brown silty sand, dry
4.5'	Grayish brown silty clay, slightly moist and cohesive, gray silty partings
6.5'	Reddish brown silty clay, very moist and cohesive
26.5'	Till
28'	

PROJECT Love Canal

OWNER State of New York

WELL NO. 85-A

LOCATION 911 97th St. - directly in front of house

	Date	Time
DRILLING STARTED	10/2/80	1615
DRILLING COMPLETED	10/3/80	0910

DRILLER Mike Warner

GEOLOGIST Tom Bolyard

RIG TYPE CME-55

REFERENCE POINT ground surface

R.P. ELEVATION ~~not yet surveyed~~ 573.2

TOPO POSITION flat lying

PROFILE BY Tom Bolyard

FIELD BOOK NO. 6 PAGES 93-95

WELL DATA

HOLE DIAMETER 7"

HOLE DEPTH 28'

CASING DIAMETER 2"

CASING LENGTH 31'

SCREEN DIAMETER 2"

SCREEN SETTING 24'-26' below ground level

SCREEN SLOT/TYPE .0001 stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/4/80 @ 1110

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

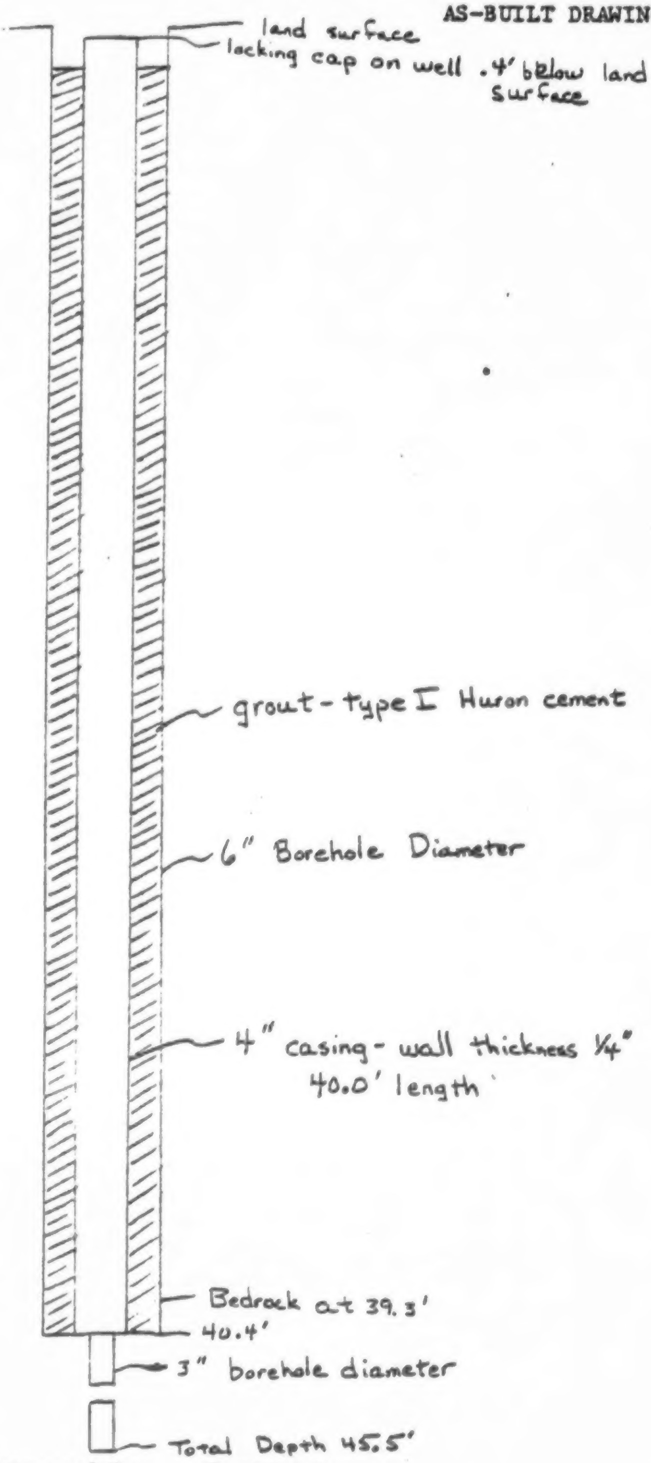
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 99-B

Project Love Canal

Location Buffalo Ave. & Cayuga Dr. south of expressway off ramp

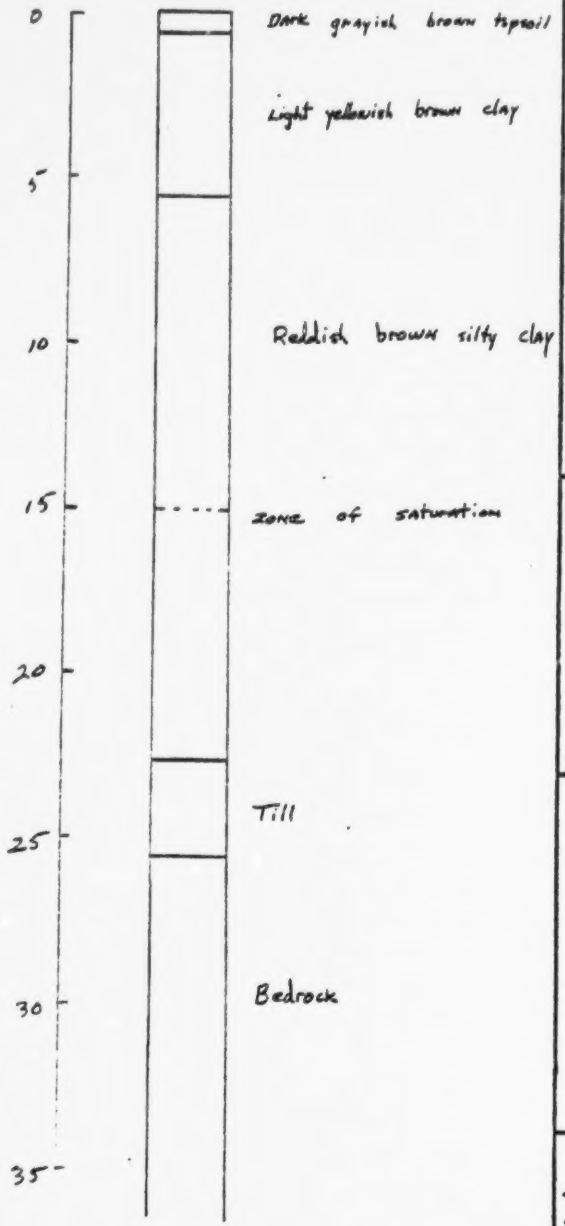
Date 10/15/80

Prepared By: David Robertson

Scale: 1"=5'

WELL LOG

PROFILE **DESCRIPTION**



PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 100-B

LOCATION Oak St., south of intersection with Pear Ave.

	Date	Time
DRILLING STARTED	10/10/80	0730
DRILLING COMPLETED	10/13/80	1000

DRILLER Ron Bush

GEOLOGIST Tom Farmer

RIG TYPE CME-55

REFERENCE POINT ground surface

R.P. ELEVATION 574.0

TOPO POSITION flat - elevated stream bank

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 **PAGES** 46, 50-52

WELL DATA

HOLE DIAMETER 6" - 2 15/16

HOLE DEPTH 31.5'

CASING DIAMETER 4"

CASING LENGTH 26'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 25.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 9.3'

DATE MEASURED 10/13/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

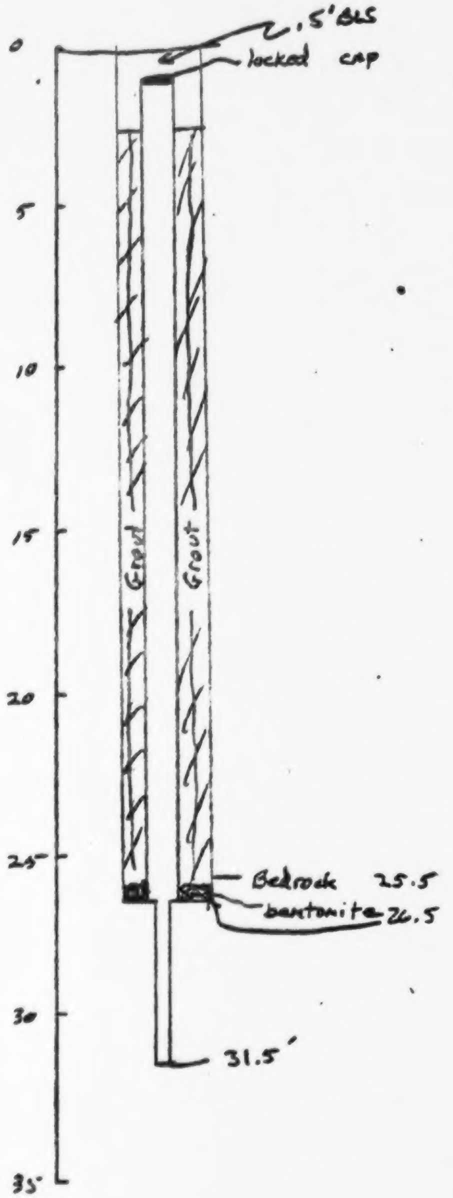
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Tom Farmer

Well No. 100-B

Project Love Canal

Location Oak St., south of intersection with Pear Ave.

Prepared By: Tom Farmer

Scale: 1"=5'

Date 10/13/80

WELL LOG

PROFILE	DESCRIPTION
.5'	loam, dark brown clay
	loam, yellow brown, sandy
3'	
	clay, brown and red brown modelled clay slightly moist
10'	
	clay, grey brown moist to wet with depth
28'	clay - till contact

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 101-A

LOCATION SW corner of 91st St. & Luick

	Date	Time
DRILLING STARTED	10/10/80	1603
DRILLING COMPLETED	10/10/80	1618

DRILLER Ed Cole

GEOLOGIST David Robertson

RIG TYPE Acker AD-2

REFERENCE POINT land surface

R.P. ELEVATION 572.9

TOPO POSITION flat lying

PROFILE BY David Robertson

FIELD BOOK NO. 5 PAGES 109-110

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 28'

CASING DIAMETER 2"

CASING LENGTH 27.5'

SCREEN DIAMETER 2"

SCREEN SETTING 26'-24'

SCREEN SLOT/TYPE 10 slot/stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/10/80 @ 1720

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

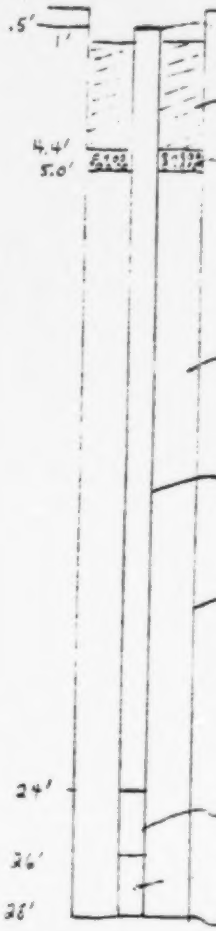
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Finished well with locking cap

AS-BUILT DRAWING



land surface

locking cap on well .5' below land surface

grout - type I Huron cement

bentonite pellets

sand - Q Rok #4 - 23' from 28'-5'

2" well pipe 27.5' with sump and screen - wall thickness 3/16"

Borehole Diameter 6"

2' screen - 100 slot, stainless steel set 26'-24'

2' sump with welded bottom

Total Depth 28'

CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

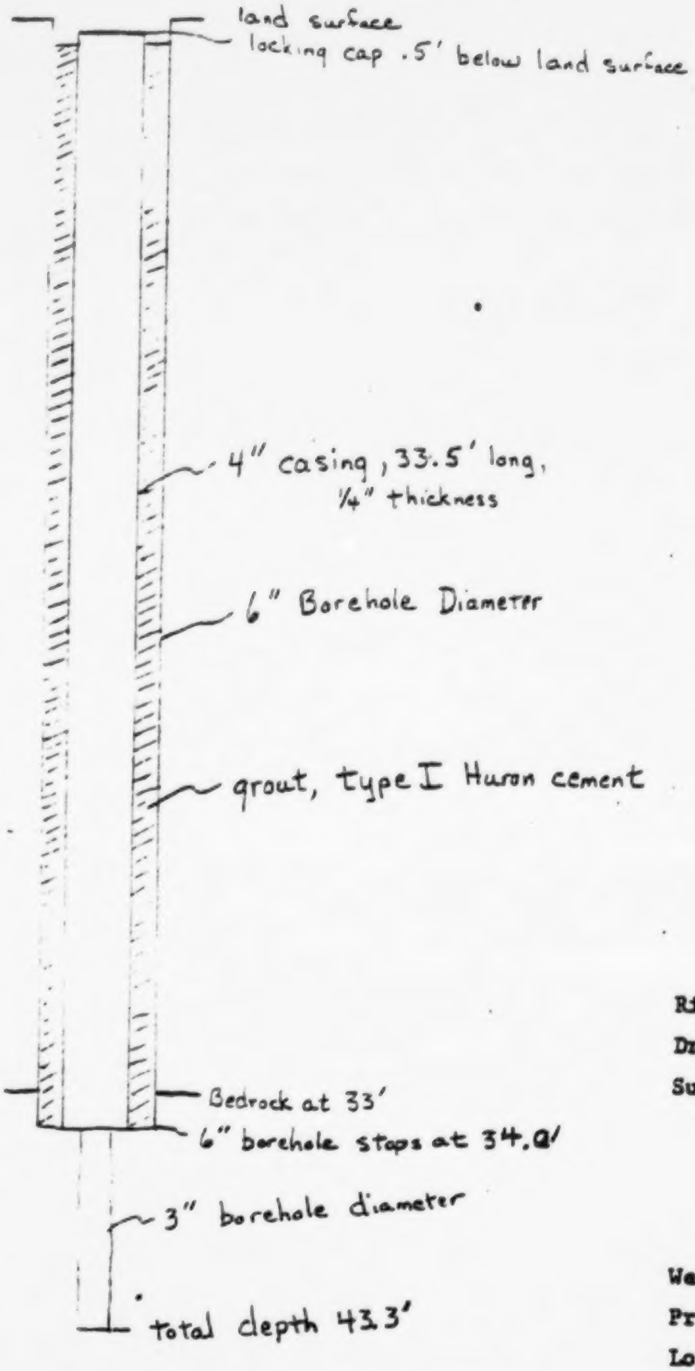
Rig Type Acker AD-2
Driller Ed Cole
Supervisory Geologist David Robertson

Well No. 101-A
Project Love Canal
Location SE corner of 91st St. and Luick St.

Prepared By: David Robertson
Scale: 1"-5'

Date 10/10/80

AS-BUILT DRAWING


land surface
locking cap .5' below land surface
4" casing, 33.5' long, 1/4" thickness
6" Borehole Diameter
grout, type I Huron cement
Bedrock at 33'
6" borehole stops at 34.0'
3" borehole diameter
total depth 43.3'

CHECKLIST

Land Surface Elevation

Casing Height Above L-S

Total Depth

Borehole Diameter

Casing Diameter

Casing Thickness

Casing Lengths

Screen Data

- Material
- Diameter
- Slot Openings
- Settings

Centralizers

Grout Type

Gravel Pack

K-Fittings

Packers

Cement Baskets

Rig Type Acker AD-2

Driller Ed Cole

Supervisory Geologist David Robertson

Well No. 101-B

Project Love Canal

Location SW corner of 91st & Luick

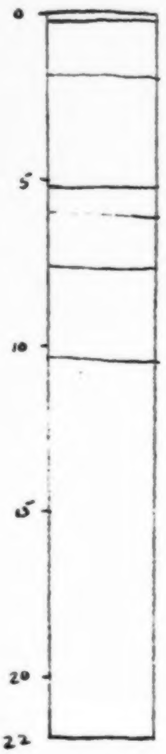
Date 10/10/80

Prepared By: David Robertson

Scale: 1"=5'

WELL LOG

PROFILE



DESCRIPTION

- TOPSOIL
- BLACK SILTY CLAY NO ODOR · FLYASH?
- BLACK SILTY CLAY MORE MOIST THAN ABOVE
- YEL BRN SILTY CLAY - ROOTS
- BLACK SILTY CLAY
- YEL. BRN SILTY CLAY
- FIRM, INTACT
- RED-BRN CLAY INCREASING MOISTURE WITH DEPTH
- VERY STICKY

TILL

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 102-A

LOCATION 90' east of blacktop - north end of 93rd St. School

	Date	Time
DRILLING STARTED	10/6/80	1450
DRILLING COMPLETED	10/6/80	1714

DRILLER Roger Logel

GEOLOGIST Dave Conover

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION 573.6

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 70, 71

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 8.5'

CASING DIAMETER 2" ID

CASING LENGTH 8.15'

SCREEN DIAMETER 2"

SCREEN SETTING 4.5'-6.5'

SCREEN SLOT/TYPE stainless, Horz. slots - .010"

PUMP TEST DATA

STATIC DEPTH TO WATER 6.1'

DATE MEASURED 10/6/80 @ 1730

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

TEST TYPE

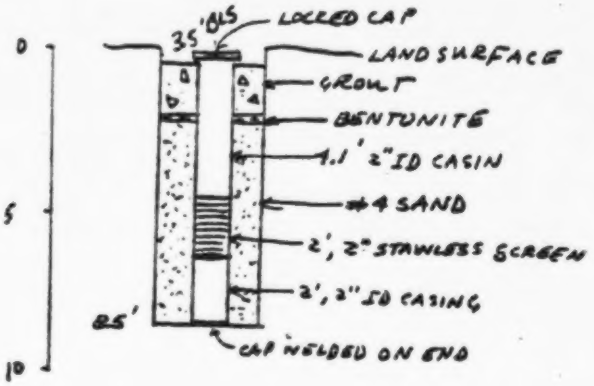
PUMP SETTING

SPECIFIC CAPACITY

REMARKS

Profile obtained from split spoon samples taken from adjacent hole - grouted up.

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-45C

Driller Roger Logel

Supervisory
Geologist Dave Conover

Well No. 102-A

Project Love Canal

Location 90' east of blacktop - north
north end of 93rd St. School

Date 10/6/80

Prepared By: Dave Conover

Scale: 1"=5'

WELL LOG

PROFILE	DESCRIPTION
0	
	YELLOW BROWN SILTY CLAY
2'	
	GRAY TO YELLOW GRAY CLAY, FRIABLE
3.5'	
	YELLOW GRAY BROWN SILTY FINE SAND
4.5'	
	GRAY SILTY CLAY
5'	
	REDDISH GRAY BROWN SILTY CLAY FINE GRAY SAND BANDS GRAY SILT MOTTLING
10'	
	GRAY SILTY CLAY, LIGHT GRAY SILT INCLUSIONS, RED VARVES
11.5'	
	REDDISH GRAY CLAY SOFT, PLASTIC
28.5'	
	SOFT TILL WITH, GRAVEL
31'	
	HARD TILL
32'	

PROJECT Love Canal
OWNER City of Niagara Falls
WELL NO. 103-A
LOCATION 404 101st St., north side of house

	Date	Time
DRILLING STARTED	10/10/80	1440
DRILLING COMPLETED	10/10/80	1810

DRILLER Mike Warner
GEOLOGIST Dennis Stanczuk
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION 574.4
TOPO POSITION flat
PROFILE BY Dennis Stanczuk
FIELD BOOK NO. 2 PAGES 103-104

WELL DATA

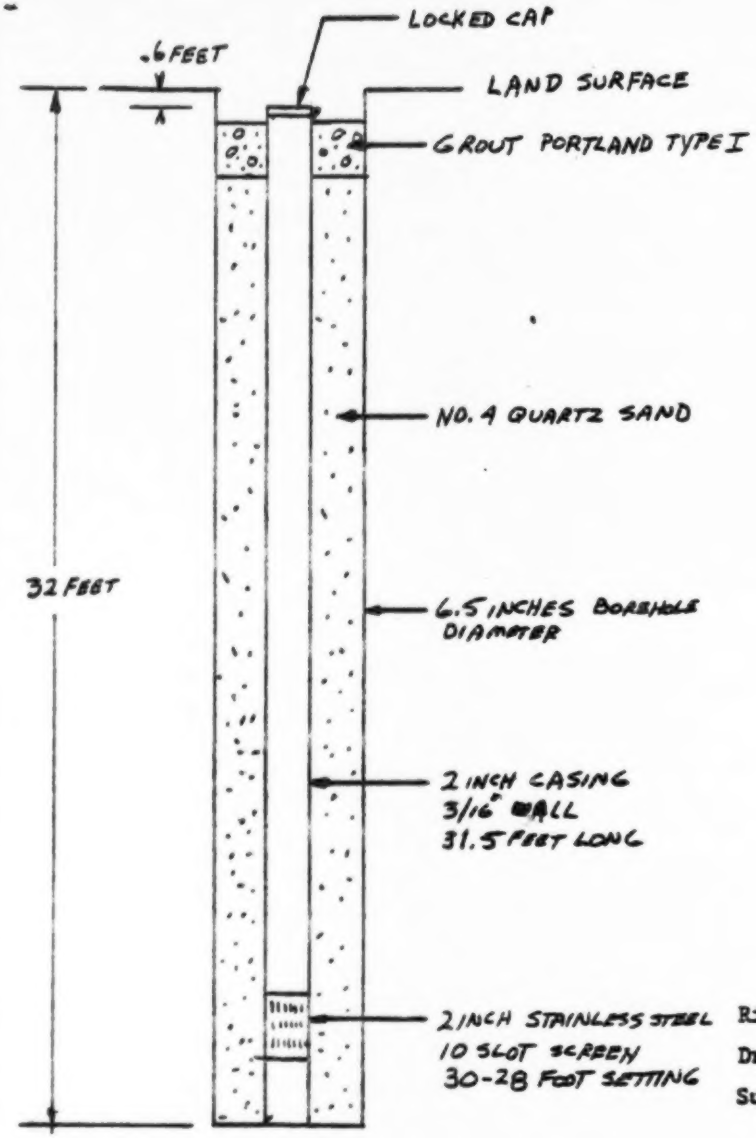
HOLE DIAMETER 6.5"
HOLE DEPTH 32'
CASING DIAMETER 2"
CASING LENGTH 31.5'
SCREEN DIAMETER 2"
SCREEN SETTING 30'-28'
SCREEN SLOT/TYPE 10 slot stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 10/10/80
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dennis Stanczuk

Well No. 103-A

Project Love Canal

Location 404 101st St., north side of house

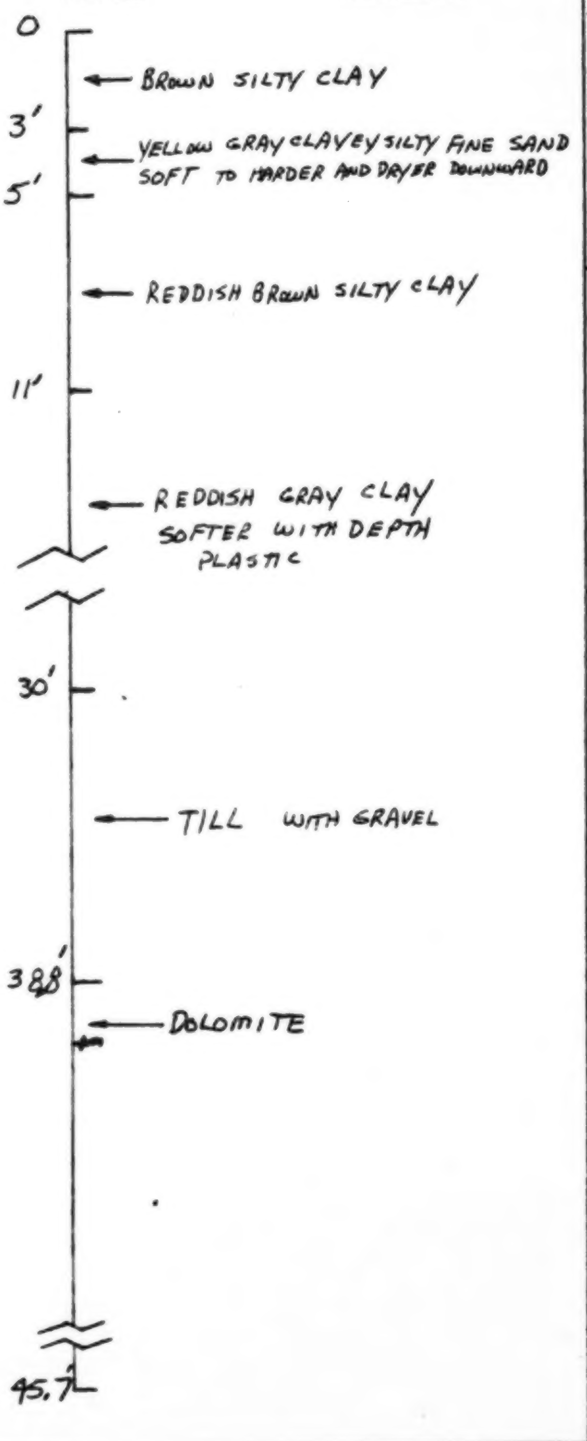
Date 10/10/80

Prepared By: Dennis Stanczuk

Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



0

BROWN SILTY CLAY

3'

YELLOW GRAY CLAYEY SILTY FINE SAND SOFT TO HARDER AND DRYER DOWNWARD

5'

REDDISH BROWN SILTY CLAY

11'

REDDISH GRAY CLAY SOFTER WITH DEPTH PLASTIC

30'

TILL WITH GRAVEL

38.8'

DOLOMITE

45.7'

PROJECT Love Canal

OWNER City of Niagara Falls

WELL NO. 103-B

LOCATION 404 101st St. - NW corner of house

	Date	Time
DRILLING STARTED	10/8/80	1530
DRILLING COMPLETED	10/14/80	1205

DRILLER Mike Warner

GEOLOGIST Dennis Stanczuk

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION 574.4

TOPO POSITION flat

PROFILE BY Dennis Stanczuk

FIELD BOOK NO. 2 PAGES 97-98,110-1

WELL DATA

HOLE DIAMETER 6.5"/5 5/8"/2 15/16"

HOLE DEPTH 38.8'/40.7'/45.7'

CASING DIAMETER 4"

CASING LENGTH 40'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 38.8'

PUMP TEST DATA after pumping

STATIC DEPTH TO WATER Dry hole/ 1 hr. 11.0'BLS

DATE MEASURED 10/8/80/ 10/14/80

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

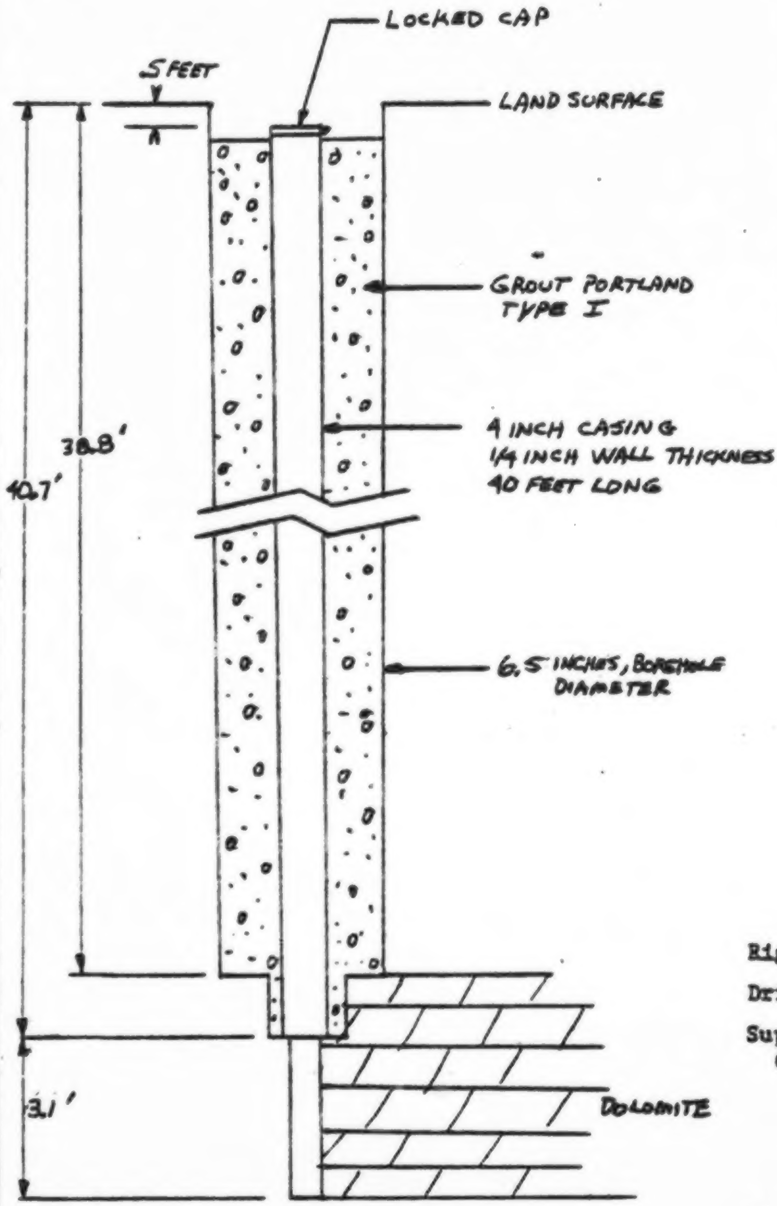
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dennis Stanczuk

Well No. 103-B

Project Love Canal

Location 404 101st St. - NW corner of house

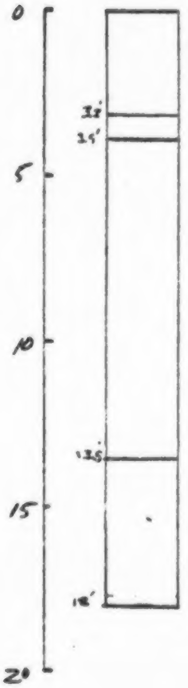
Date 10/14/80

Prepared By: Dennis Stanczuk

Scale: 1"=5'

WELL LOG

PROFILE **DESCRIPTION**



Dark brown topsoil

Lighter brown, yellowish clay

Darker brown, moist clay

Zone of saturation

Brown, wet clay

PROJECT Love Canal
OWNER State of New York
WELL NO. 104-A
LOCATION Vacant lot across 99th St. from Well 104-B

	Date	Time
DRILLING STARTED	10/9/80	1445
DRILLING COMPLETED	10/9/80	1705

DRILLER Ron Bush
GEOLOGIST Tom Farmer
RIG TYPE CME-55
REFERENCE POINT ground level
R.P. ELEVATION 573.9
TOPO POSITION level
PROFILE BY Tom Farmer
FIELD BOOK NO. 11 **PAGES** 45

WELL DATA

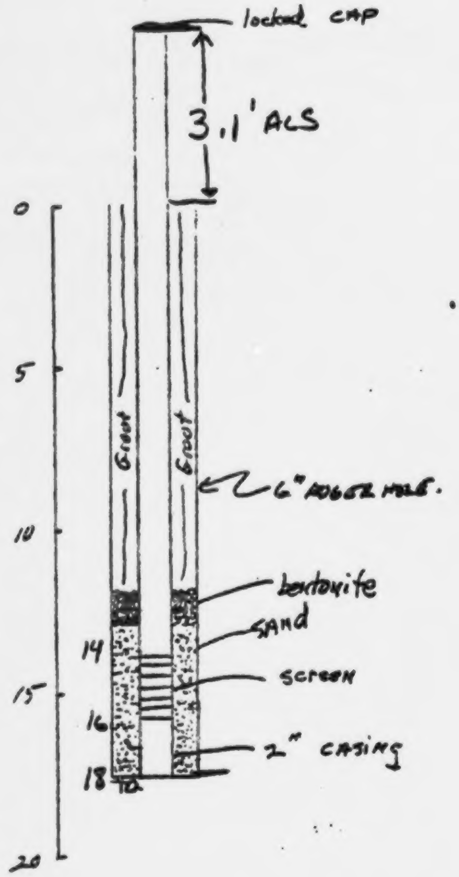
HOLE DIAMETER 6"
HOLE DEPTH 18'
CASING DIAMETER 2"
CASING LENGTH 21.1'
SCREEN DIAMETER 2"
SCREEN SETTING 14'-16'
SCREEN SLOT/TYPE 100 stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 10/9/80
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation

Casing Height Above L-S

Total Depth

Borehole Diameter

Casing Diameter

Casing Thickness

Casing Lengths

Screen Data
- Material
- Diameter
- Slot Openings
- Settings

Centralizers

Grout Type

Gravel Pack

K-Fittings

Packers

Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Tom Farmer

Well No. 104-A

Project Love Canal

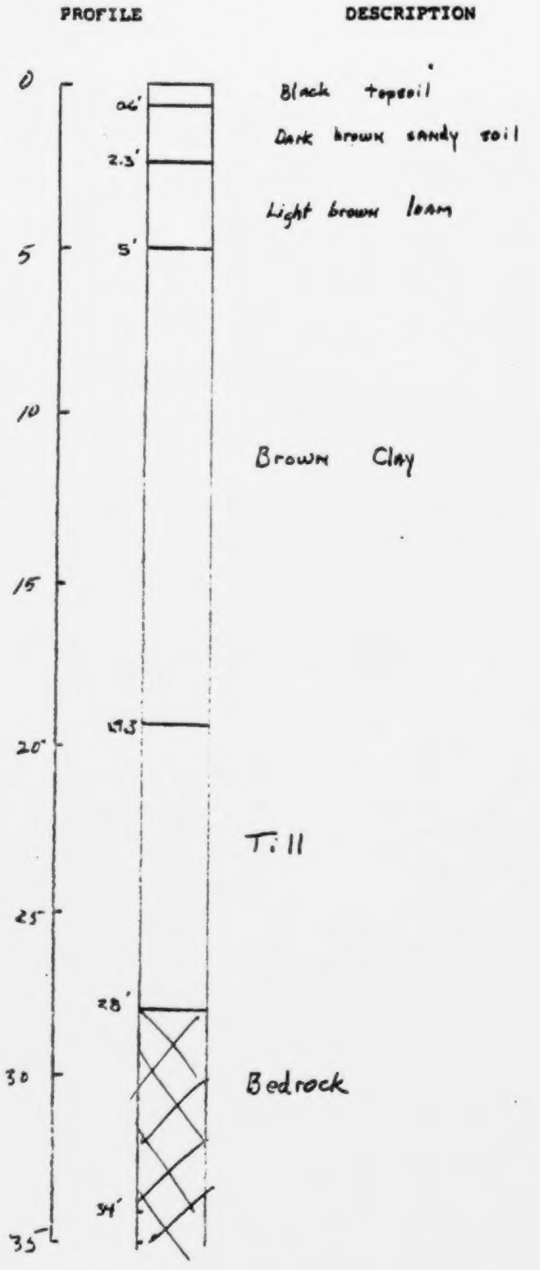
Location Vacant lot across street from 104-B

Date 10/16/80

Prepared By: Tom Farmer

Scale: 1"=5'

WELL LOG



PROJECT Love Canal

OWNER State of New York

WELL NO. 104-B

LOCATION 743 99th St.

	Date	Time
DRILLING STARTED	10/8/80	1610
DRILLING COMPLETED	10/11/80	0915

DRILLER Ron Bush

GEOLOGIST Tom Farmer

RIG TYPE CME-55

REFERENCE POINT ground surface

R.P. ELEVATION 573.9

TOPO POSITION flat

PROFILE BY Tom Farmer

FIELD BOOK NO. 11 **PAGES** 43-45,47-48

WELL DATA

HOLE DIAMETER 6" - 2 15/16

HOLE DEPTH 34.0' - Total

CASING DIAMETER 4"

CASING LENGTH 31'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 28.0'

PUMP TEST DATA

STATIC DEPTH TO WATER 8.99'

DATE MEASURED 10/11/80

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

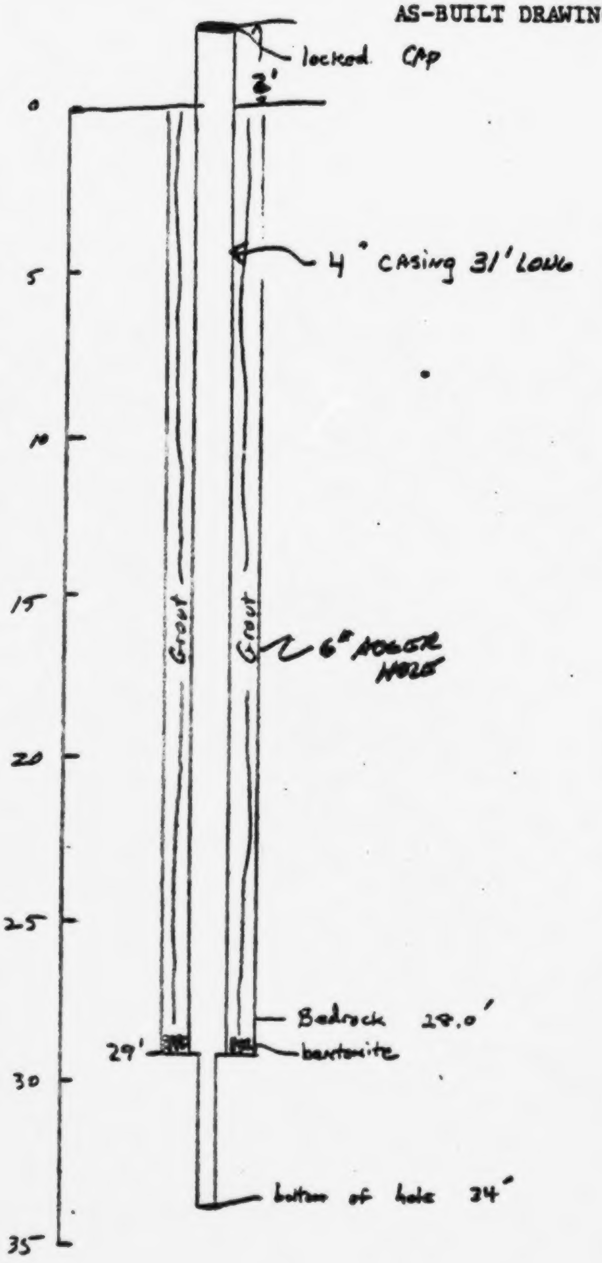
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Tom Farmer

Well No. 104-B
Project Love Canal
Location 743 99th St.

Date 10/13/80

Prepared By: Tom Farmer
Scale: 1"=5'

WELL LOG

PROFILE **DESCRIPTION**

0'
.5' — BROWN SANDY SILTY LOAM
— YELLOW BROWN SANDY SILTY LOAM WITH GRAVEL
3'
— MOTTLED REDDISH BROWN AND GRAY SILTY CLAY, ALSO VARVED RED, BROWN, AND GRAY BROWN SILTY CLAY
13'
— REDDISH GRAY CLAY PLASTIC, MOIST
25.5
— REDDISH BROWN TILL WITH GRAVEL

PROJECT Love Canal
OWNER New York State Dept. of Transportation
WELL NO. 108-A
LOCATION NW corner of Williams Rd. and LaSalle Parkway, north ramp

	Date	Time
DRILLING STARTED	10/15/80	1325
DRILLING COMPLETED	10/15/80	1550

DRILLER Mike Warner
GEOLOGIST Dennis Stanczuk
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION 572.8
TOPO POSITION on a slight rise beside a swampy area
PROFILE BY Dennis Stanczuk
FIELD BOOK NO. 2 **PAGES** 116

WELL DATA

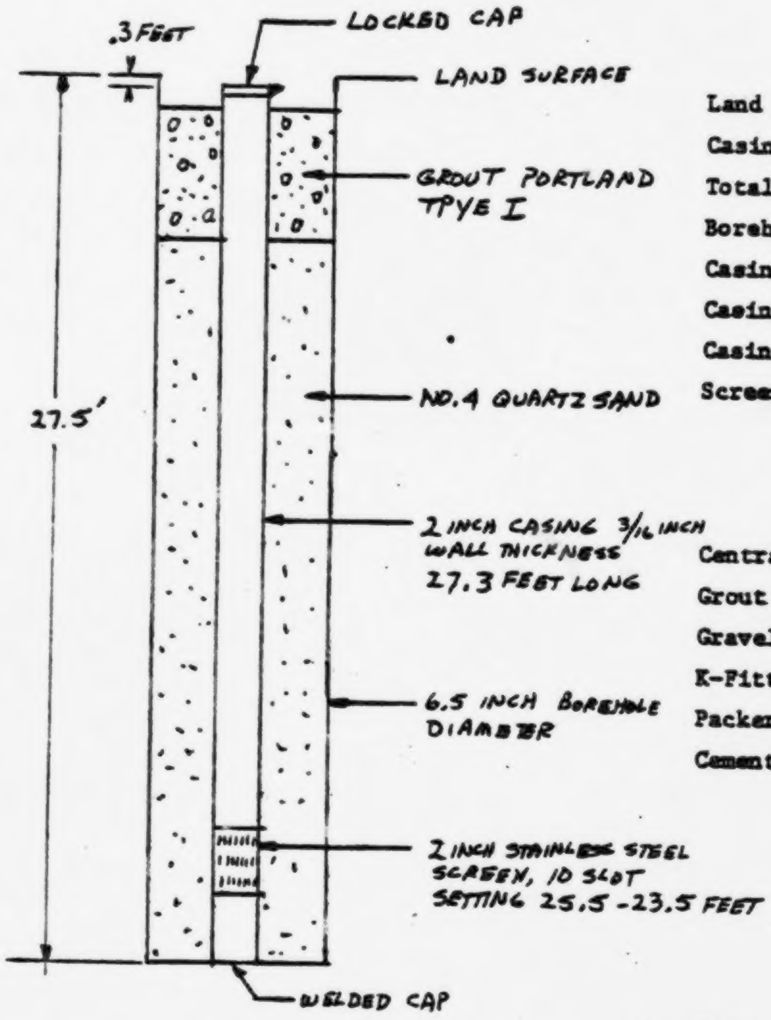
HOLE DIAMETER 6.5"
HOLE DEPTH 27.5'
CASING DIAMETER 2"
CASING LENGTH 27.3'
SCREEN DIAMETER 2"
SCREEN SETTING 25.5'-23.5'
SCREEN SLOT/TYPE 10 slot stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole
DATE MEASURED 10/15/80
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING


.3 FEET
LOCKED CAP
LAND SURFACE
GROUT PORTLAND TPYE I
NO.4 QUARTZ SAND
2 INCH CASING 3/16 INCH WALL THICKNESS 27.3 FEET LONG
6.5 INCH BOREHOLE DIAMETER
2 INCH STAINLESS STEEL SCREEN, 10 SLOT SETTING 25.5 -23.5 FEET
27.5'
WELDED CAP

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
    - Material
    - Diameter
    - Slot Openings
    - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dennis Stanczuk

Well No. 108-A

Project Love Canal

Location NW corner of Williams Rd. & LaSalle Parkway, north ramp

Date 10/15/80

Prepared By: Dennis Stanczuk

Scale: 1"=5'

WELL LOG

PROFILE **DESCRIPTION**

0'
.5' — BROWN SANDY SILTY LOAM
— YELLOW BROWN SANDY SILTY LOAM WITH GRAVEL
3'
— MOTTLED REDDISH BROWN AND GRAY SILTY CLAY, AND VARVED RED, BROWN, AND GRAY BROWN SILTY CLAY
13'
— REDDISH GRAY CLAY PLASTIC, MOIST
25.5
— REDDISH BROWN TILL WITH GRAVEL
33.7
DOLOMITE
43.6'

PROJECT	Love Canal
OWNER	N.Y. State Dept. of Transportation
WELL NO.	108-B
LOCATION	NW corner of Williams Rd. and LaSalle Parkway, north ramp

	Date	Time
DRILLING STARTED	10/15/80	0930
DRILLING COMPLETED	10/16/80	1415

DRILLER	Mike Warner
GEOLOGIST	Dennis Stanczuk/Dave Robertson
RIG TYPE	CME-55
REFERENCE POINT	land surface
R.P. ELEVATION	572.8
TOPO POSITION	on a slight rise beside a swamp
PROFILE BY	Dennis Stanczuk
FIELD BOOK NO.	2/5
PAGES	114-115/ 119

WELL DATA

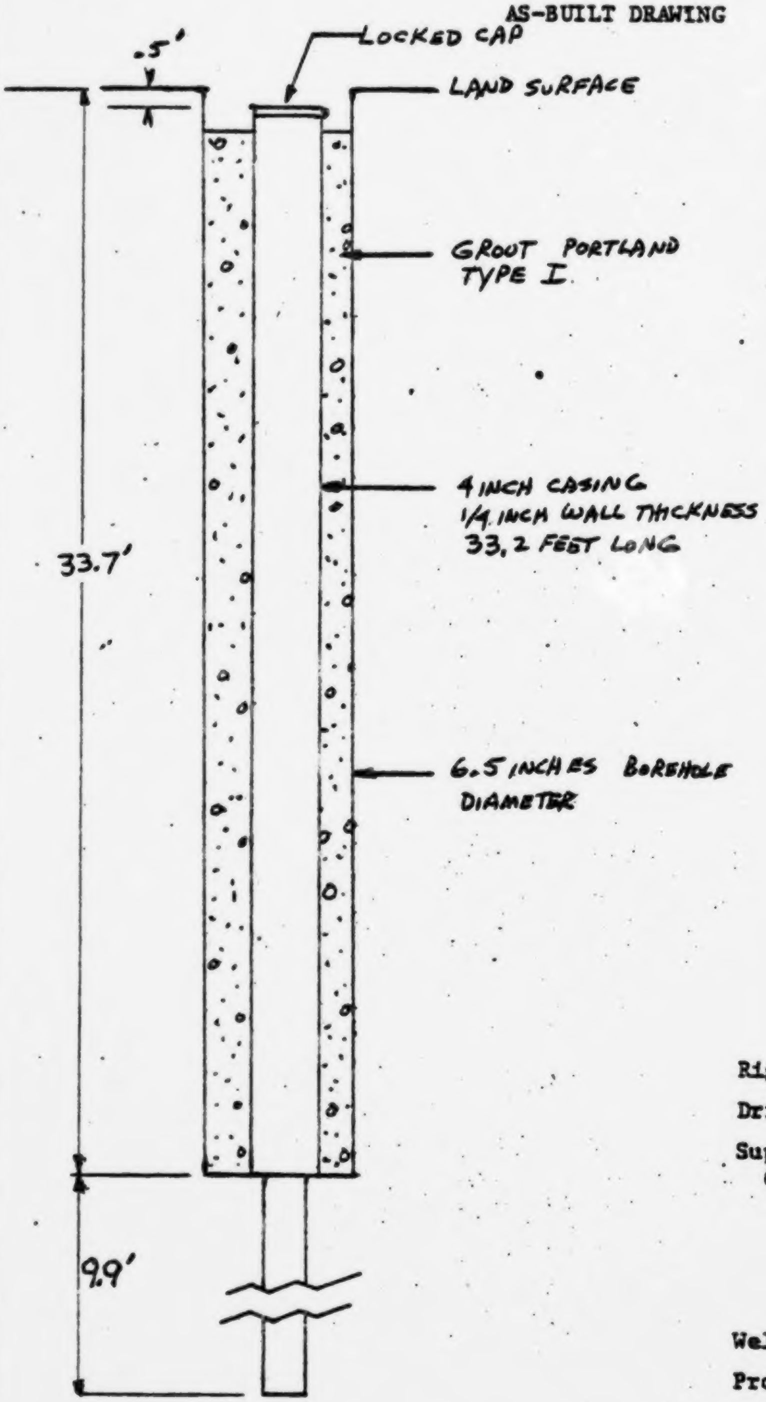
HOLE DIAMETER	6.5"/2 15/16"
HOLE DEPTH	33.7'/43.6'
CASING DIAMETER	4"
CASING LENGTH	33"
SCREEN DIAMETER	N/A
SCREEN SETTING	N/A
SCREEN SLOT/TYPE	N/A
DEPTH TO BEDROCK	33.7'

PUMP TEST DATA

STATIC DEPTH TO WATER	Dry hole; 7.0' BLS
DATE MEASURED	10/15/80; 10/17/80
PUMPING DEPTH TO WATER	not tested
TEST DURATION	
PUMPING RATE	
TEST DATE	
TEST TYPE	
PUMP SETTING	
SPECIFIC CAPACITY	

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

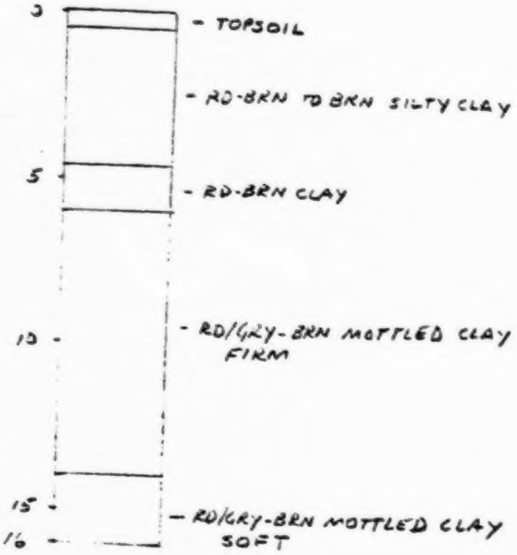
Rig Type CME-55
Driller Mike Warner
Supervisory Geologist David Robertson/ Dennis Stanczuk/

Well No. 108-B
Project Love Canal
Location NW corner of Williams Rd. and LaSalle Parkway, north ramp
Date 10/16/80

Prepared By: Dennis Stanczuk
Scale: 1"=5'

WELL LOG

PROFILE **DESCRIPTION**


0
- TOPSOIL
- RD-BRN TO BRN SILTY CLAY
5
- RD-BRN CLAY
10
- RD/GRY-BRN MOTTLED CLAY FIRM
15
16
- RD/GRY-BRN MOTTLED CLAY SOFT

SCALE: 1" = 5'

PROJECT Love Canal

OWNER Lottie Adams

WELL NO. 109-A

LOCATION 478 103rd St. - rear

	Date	Time
DRILLING STARTED	10/13/80	1600
DRILLING COMPLETED	10/13/80	1625

DRILLER Roger Logel

GEOLOGIST Dave Conover

RIG TYPE CME-45C

REFERENCE POINT land surface

R.P. ELEVATION 571.5

TOPO POSITION flat lying, local depression

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 83,84

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 16'

CASING DIAMETER 2" ID

CASING LENGTH 11.5' plus 2' sump

SCREEN DIAMETER 2"

SCREEN SETTING 12'-14'

SCREEN SLOT/TYPE stainless, .0001 horz. slot

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/15/80 @ 1025

PUMPING DEPTH TO WATER

TEST DURATION

PUMPING RATE

TEST DATE

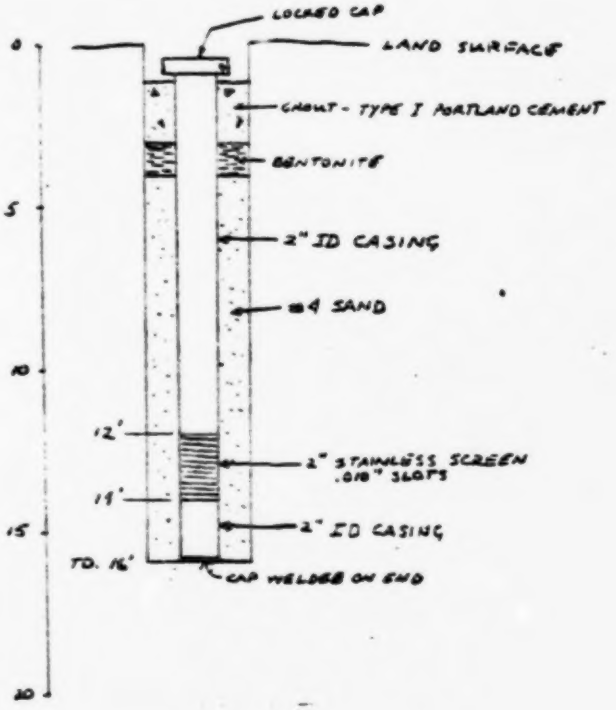
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-45
Driller Roger Logel
Supervisory Geologist Dave Conover

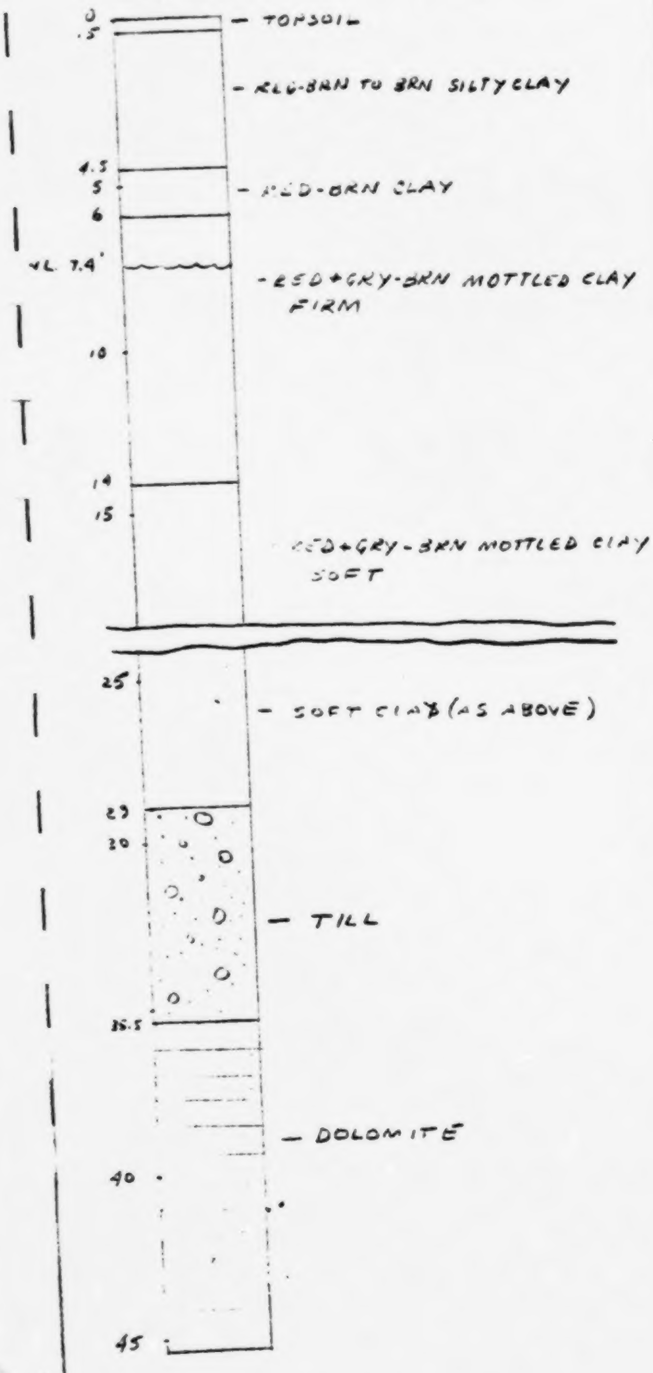
Well No. 109-A
Project Love Canal
Location 478 103rd St. -rear

Date 10/13/80

Prepared By: Dave Conover
Scale: 1"=5'

WELL LOG

PROFILE DESCRIPTION



SCALE. 1" = 5'

PROJECT Love Canal

OWNER Lottie Adams

WELL NO. 109-B

LOCATION 478 103rd St. – rear

	Date	Time
DRILLING STARTED	10/11/80	1105
DRILLING COMPLETED	10/15/80	1113

DRILLER Roger Logel, Joe Jensen

GEOLOGIST Dave Conover

RIG TYPE CME-45C, CME-55

REFERENCE POINT land surface

R.P. ELEVATION 571.5

TOPO POSITION flat lying

PROFILE BY Dave Conover

FIELD BOOK NO. 8 PAGES 83,84,86

WELL DATA

HOLE DIAMETER 6", 3"

HOLE DEPTH 6":36.5', 3":9'

CASING DIAMETER 4"

CASING LENGTH 36'

SCREEN DIAMETER N/A

SCREEN SETTING N/A

SCREEN SLOT/TYPE N/A

DEPTH TO BEDROCK 35.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 7.38'

DATE MEASURED 10/15/80 @ 1130

PUMPING DEPTH TO WATER not pumped

TEST DURATION

PUMPING RATE

TEST DATE

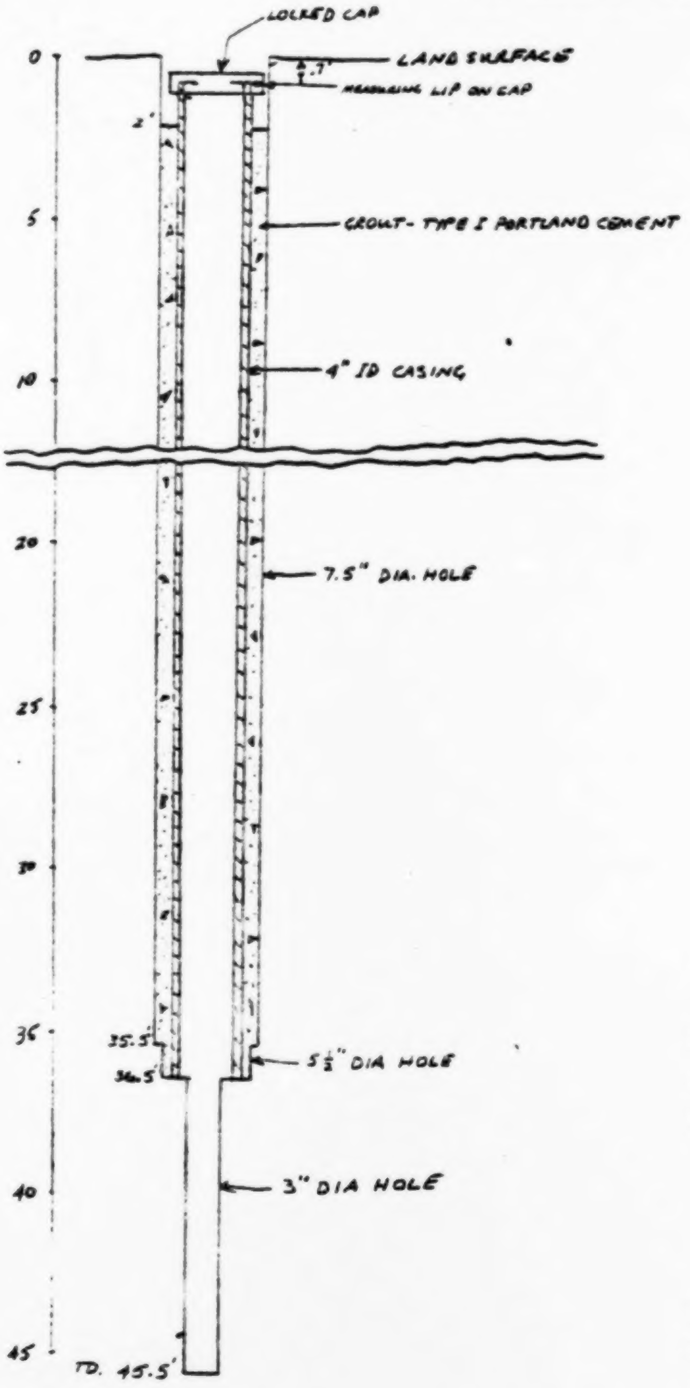
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation

Casing Height Above L-S

Total Depth

Borehole Diameter

Casing Diameter

Casing Thickness

Casing Lengths

Screen Data

- Material
- Diameter
- Slot Openings
- Settings

Centralizers

Grout Type

Gravel Pack

K-Fittings

Packers

Cement Baskets

Rig Type CME-45C, CME-55

Driller Roger Logel, Joe Jensen

Supervisory Geologist Dave Conover

Well No. 109-B

Project Love Canal

Location 478 103rd St. - rear

Prepared By: Dave Conover

Scale: 1"=5'

Date 10/15/80

WELL LOG

PROFILE	DESCRIPTION
0 – .5'	REDDISH GRAY BROWN SILTY CLAY LOAM
.5' – 6'	DARK GRAY SILTY CLAY FLY ASH, CINDERS
6' – 9'	REDDISH BROWN SILTY CLAY
9' – 16'	SOFT REDDISH GRAY CLAY
16' – 17'	SOFT TILL
17' – 18.5'	HARD TILL

PROJECT Love Canal
OWNER Kenneth Knapp
WELL NO. 110-A
LOCATION 545 101st St. - behind house

	Date	Time
DRILLING STARTED	10/14/80	1425
DRILLING COMPLETED	10/14/80	1530

DRILLER Mike Warner
GEOLOGIST Dennis Stanczuk
RIG TYPE CME-55
REFERENCE POINT land surface
R.P. ELEVATION 574.4
TOPO POSITION flat
PROFILE BY Dennis Stanczuk
FIELD BOOK NO. 2 PAGES 112-113

WELL DATA

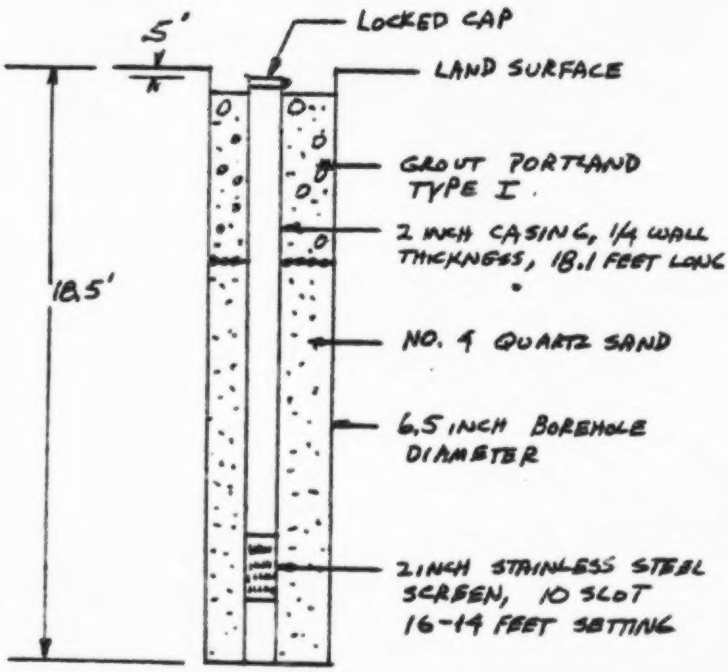
HOLE DIAMETER 6.5"
HOLE DEPTH 18.5'
CASING DIAMETER 2"
CASING LENGTH 18.1'
SCREEN DIAMETER 2"
SCREEN SETTING 16'-14'
SCREEN SLOT/TYPE 10 slot stainless steel

PUMP TEST DATA

STATIC DEPTH TO WATER 17' BLS
DATE MEASURED 10/14/80
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING


5'
LOCKED CAP
LAND SURFACE
GROUT PORTLAND TYPE I
2 INCH CASING, 1/4 WALL THICKNESS, 18.1 FEET LONG
18.5'
NO. 4 QUARTZ SAND
6.5 INCH BOREHOLE DIAMETER
2 INCH STAINLESS STEEL SCREEN, 10 SLOT 16-14 FEET SETTING

CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Mike Warner

Supervisory Geologist Dennis Stanczuk

Well No. 110-A

Project Love Canal

Location 545 101st St. - behind house

Prepared By: Dennis Stanczuk

Scale: 1"=5'

Date 10/14/80

WELL LOG

PROFILE	DESCRIPTION
0	
.5'	REDDISH BROWN SILTY CLAY
	DARK GRAY SILTY SANDY CLAY LOAM
3'	
	DARK GRAY SILTY SANDY CLAY/LOAM MOIST
6'	
	REDDISH BROWN SILTY CLAY PEBBLES AND DARK GRAY SILT PARTINGS
11'	
	REDDISH GRAY PLASTIC CLAY
16'	
	SOFT TILL
17'	
	HARD TILL
35.5'	
	DOLOMITE
41.3'	

PROJECT Love Canal
OWNER Kenneth Knapp
WELL NO. 110-B
LOCATION 545 101st St. behind house

	Date	Time
DRILLING STARTED	10/13/80	1243
DRILLING COMPLETED	10/15/80	1530

DRILLER Mike Warner, (Ron Bush)
GEOLOGIST Dennis Stanczuk, (Tom Farmer)
RIG TYPE CME-55
REFERENCE POINT
R.P. ELEVATION not yet surveyed 574.4
TOPO POSITION flat
PROFILE BY Dennis Stanczuk
FIELD BOOK NO. 2, (11) **PAGES** 106,107,108, 109,117,118, (53)

WELL DATA

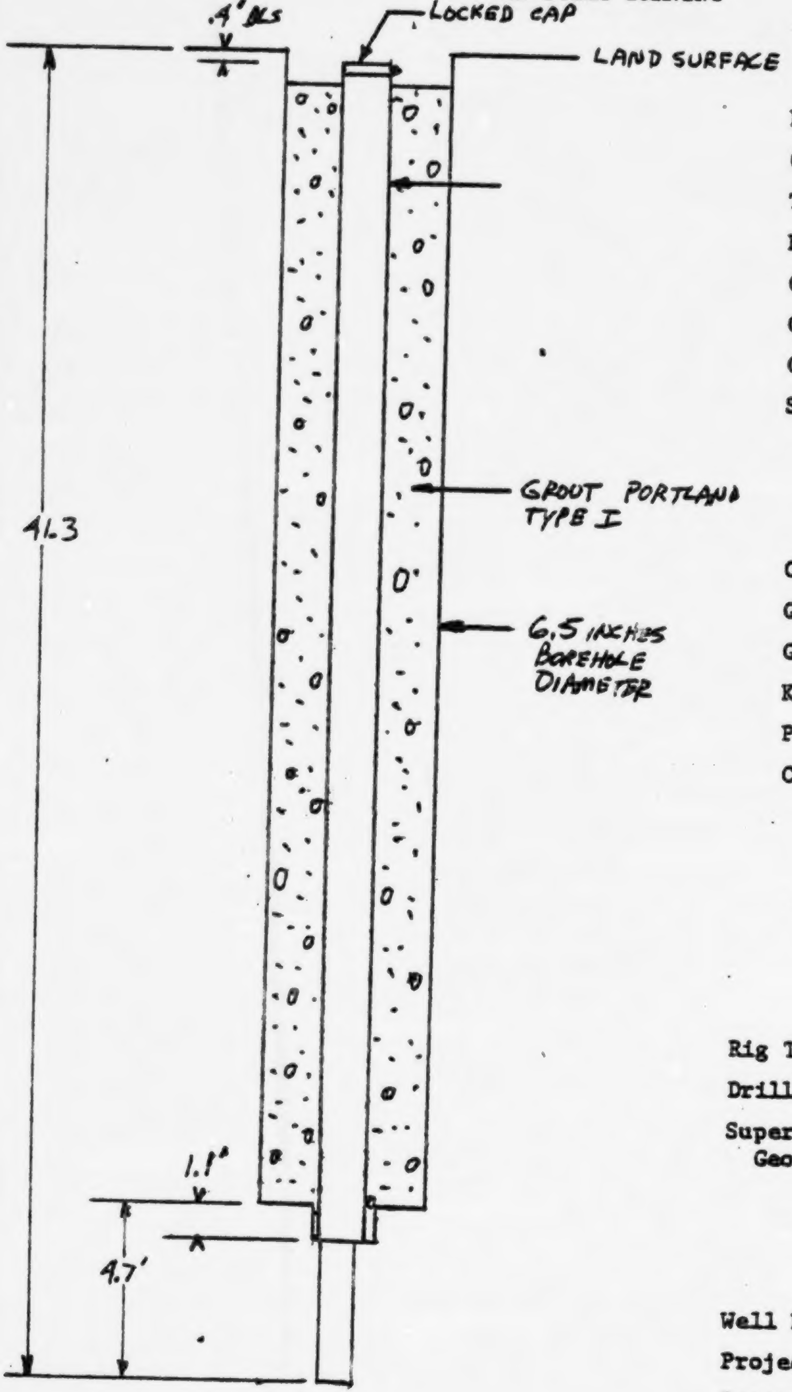
HOLE DIAMETER 65."/5 5/8"/ 3"
HOLE DEPTH 35.5'/36.6'/41.3
CASING DIAMETER 4"
CASING LENGTH 36.2'
SCREEN DIAMETER N/A
SCREEN SETTING N/A
SCREEN SLOT/TYPE N/A
DEPTH TO BEDROCK 35.5'

PUMP TEST DATA

STATIC DEPTH TO WATER 16.0';11.45'
DATE MEASURED 10/13/80;10/15/80
PUMPING DEPTH TO WATER not tested
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Mike Warner (Ron Bush)
Supervisory Geologist Dennis Stanczuk, (Tom Farmer)

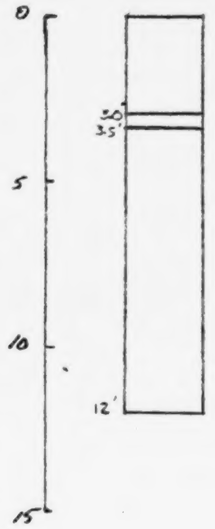
Well No. 110-B
Project Love Canal
Location 545 101st St. - behind house

Date 10/15/80

Prepared By: Dennis Stanczuk
Scale: 1"=5'

WELL LOG

PROFILE **DESCRIPTION**



Brownish grey topsoil

Brown, wet sand

Yellowish brown clay
zone of saturation
at 6'

Bottom of hole 12'

PROJECT Love Canal
OWNER Unknown
WELL NO. 111-A
LOCATION 702 101st St.

	Date	Time
DRILLING STARTED	10/13/80	1330
DRILLING COMPLETED	10/13/80	1500

DRILLER Ron Bush
GEOLOGIST Tom Farmer
RIG TYPE CME-55
REFERENCE POINT ground surface
R.P. ELEVATION 574.3
TOPO POSITION flat
PROFILE BY Tom Farmer
FIELD BOOK NO. 11 **PAGES** 53

WELL DATA

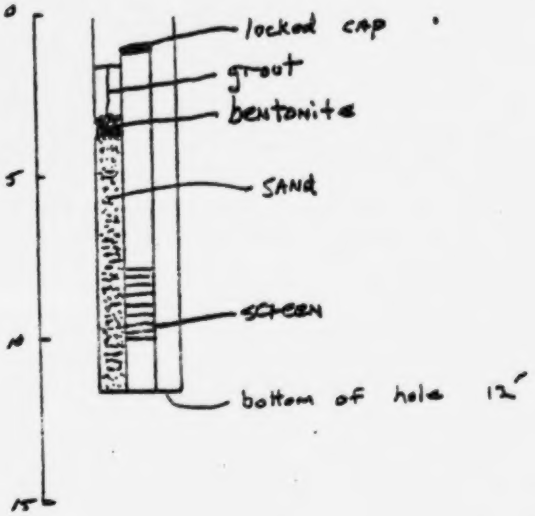
HOLE DIAMETER 6"
HOLE DEPTH 12'
CASING DIAMETER 2"
CASING LENGTH 11.5'
SCREEN DIAMETER 2"
SCREEN SETTING 8'-10'
SCREEN SLOT/TYPE 100-stainless

PUMP TEST DATA

STATIC DEPTH TO WATER 6'
DATE MEASURED 10/13/80
PUMPING DEPTH TO WATER
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
  Material
  Diameter
  Slot Openings
  Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Tom Farmer

Well No. 111-A
Project Love Canal
Location 702 101st St.

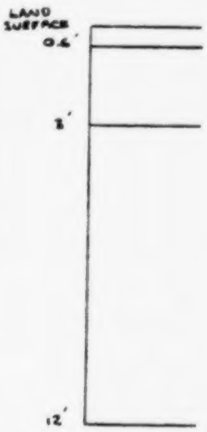
Prepared By: Tom Farmer
Scale: 1"=5'

Date 10/15/80

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN SILTY CLAY LOAM, MOIST, SLIGHTLY PLASTIC

DARK BROWN AND YELLOW BROWN SILTY CLAY LOAM AND SANDY CLAY, MOIST

VERY DARK GRAY SANDY LOAM, VERY MOIST TO WET, HIGH ORGANIC MATTER

SCALE: 1" = 5'

PROJECT LOVE CANAL

OWNER CITY OF NIAGRA FALLS

WELL NO. 112A

LOCATION SW END OF JAYNE PARK

	Date	Time
DRILLING STARTED	10/14/80	1448
DRILLING COMPLETED	10/14/80	1537

DRILLER JOE JENSEN

GEOLOGIST DAVE CONOVER

RIG TYPE CME-55

REFERENCE POINT LAND SURFACE

R.P. ELEVATION 5680

TOPO POSITION FLAT-LYING

PROFILE BY PHIL SPOONER

FIELD BOOK NO. 8 PAGES 85,86

WELL DATA

HOLE DIAMETER 6"

HOLE DEPTH 12'

CASING DIAMETER 2" ID

CASING LENGTH 7.5 + 2' SUMP

SCREEN DIAMETER 2"

SCREEN SETTING 8' - 10'

SCREEN SLOT/TYPE STAINLESS, HORZ SLOT .010"

PUMP TEST DATA

STATIC DEPTH TO WATER 2.8'

DATE MEASURED 10/15/80 1605

PUMPING DEPTH TO WATER NOT TESTED

TEST DURATION

PUMPING RATE

TEST DATE

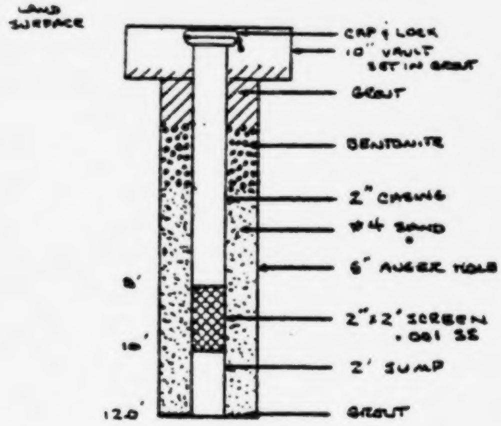
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller JOE JENSEN

Supervisory Geologist DAVE CONOVER

Well No. 112-A

Project LOVE CANAL

Location WEST END OF JAYNE PARK

Prepared By: PHIL SPOONER

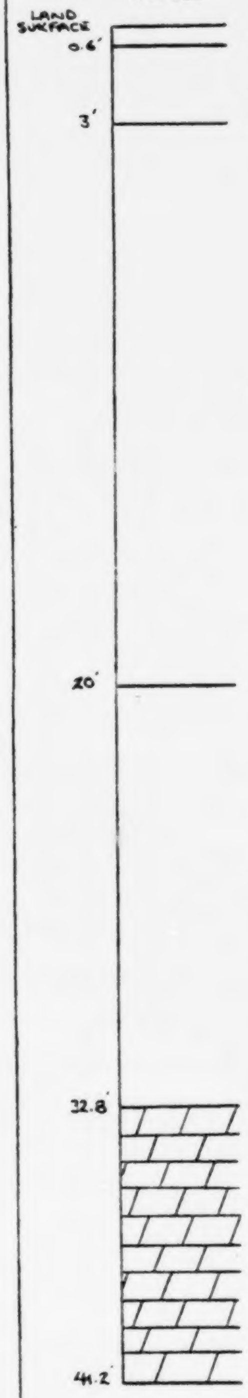
Scale: 1" = 5'

Date OCTOBER 14, 1980

WELL LOG

PROFILE

DESCRIPTION



DARK BROWN SILTY CLAY LOAM, MOIST, SLIGHTLY PLASTIC

DARK BROWN AND YELLOW BROWN SILTY CLAY LOAM AND SANDY CLAY, MOIST

VERY DARK GRAY SANDY LOAM, VERY MOIST TO WET, HIGH ORGANIC MATTER

PALE RED BROWN SANDY CLAY TO SANDY CLAY LOAM, VERY WET, VERY GRAVELLY, COBBLY (TILL)

LOCKPORT DOLOMITE

SCALE: 1" = 5'

PROJECT LOVE CANAL
OWNER CITY OF NIAGARA FALLS
WELL NO. 112B
LOCATION SW END OF JAYNE PARK

	Date	Time
DRILLING STARTED	10/13/80	1522
DRILLING COMPLETED	10/15/80	1505

DRILLER JOE JENSEN
GEOLOGIST DAVE CONOVER
RIG TYPE CME-55
REFERENCE POINT LAND SURFACE
R.P. ELEVATION 568.0
TOPO POSITION FLAT LYING
PROFILE BY PHIL SPOONER
FIELD BOOK NO. 8 PAGES 85-87

WELL DATA

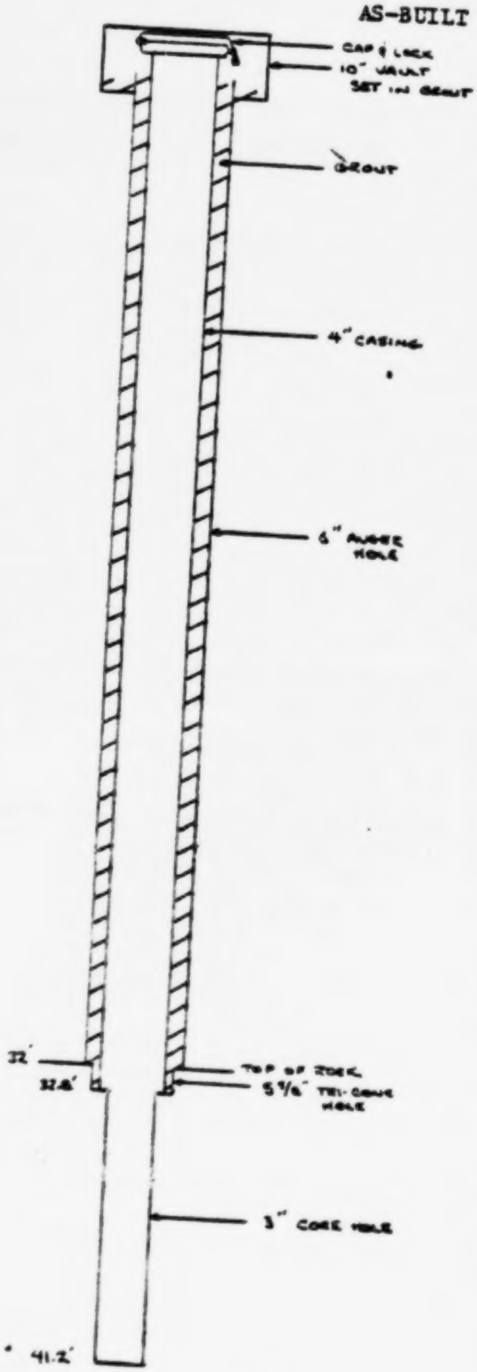
HOLE DIAMETER 6", 3"
HOLE DEPTH 6": 32.8, 3": 8.4' TD: 41.2'
CASING DIAMETER 4"
CASING LENGTH 32,8'
SCREEN DIAMETER NONE USED
SCREEN SETTING
SCREEN SLOT/TYPE
DEPTH TO BEDROCK: 32'

PUMP TEST DATA

STATIC DEPTH TO WATER 2,8'
DATE MEASURED 10/15/80 1556
PUMPING DEPTH TO WATER NOT PUMPED
TEST DURATION
PUMPING RATE
TEST DATE
TEST TYPE
PUMP SETTING
SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55

Driller JOE JENSEN

Supervisory Geologist DAVE CONOVER

Well No. 112-B

Project LOVE CANAL

Location WEST END OF JAYNE PARK

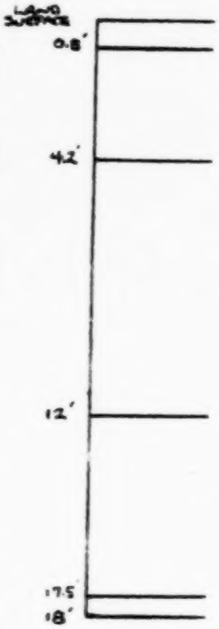
Prepared By: PHIL SPOONER

Scale: 1" = 5'

Date OCTOBER 14, 1980

WELL LOG

PROFILE **DESCRIPTION**



DARK BROWN LOAM TO SILT LOAM, MOIST, LOOSE

PALE YELLOW BROWN LOAMY FINE SAND, VERY MOIST TO WET, PLASTIC

PALE GRAY BROWN SILTY CLAY, MOIST, PLASTIC, NON-STICKY

PALE RED BROWN CLAY TO SILTY CLAY, VERY MOIST TO WET, VERY PLASTIC, VERY STICKY

RED BROWN SILTY CLAY, MOIST, PLASTIC, VERY GRAVELLY (TILL)

SCALE: 1" = 5'

PROJECT Love Canal

OWNER State of New York

WELL NO. 113-A

LOCATION 759 99th St. - front yard

	Date	Time
DRILLING STARTED	10/16/80	1311
DRILLING COMPLETED	10/16/80	1505

DRILLER Ron Bush

GEOLOGIST Phil Spooner

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION 579.7

TOPO POSITION flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 PAGES 51-53

WELL DATA

HOLE DIAMETER 8"

HOLE DEPTH 18.0'

CASING DIAMETER 2"

CASING LENGTH 20.2'

SCREEN DIAMETER 2"

SCREEN SETTING 14'-16' BLS

SCREEN SLOT/TYPE .001 stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/16/80 @ 1513

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

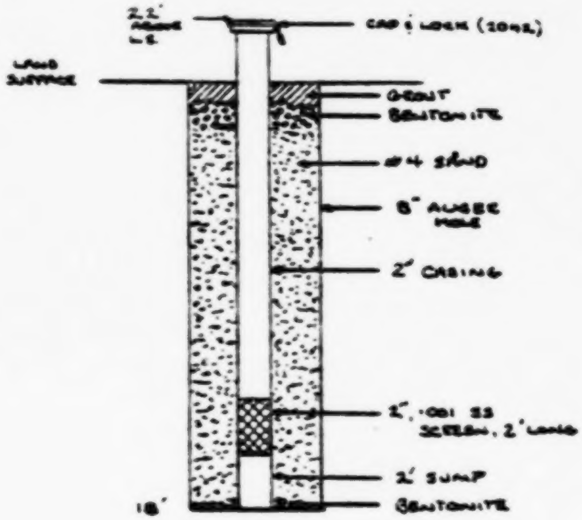
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

Land Surface Elevation
Casing Height Above L-S
Total Depth
Borehole Diameter
Casing Diameter
Casing Thickness
Casing Lengths
Screen Data
    Material
    Diameter
    Slot Openings
    Settings
Centralizers
Grout Type
Gravel Pack
K-Fittings
Packers
Cement Baskets

Rig Type CME-55
Driller Ron Bush
Supervisory Geologist Phil Spooner

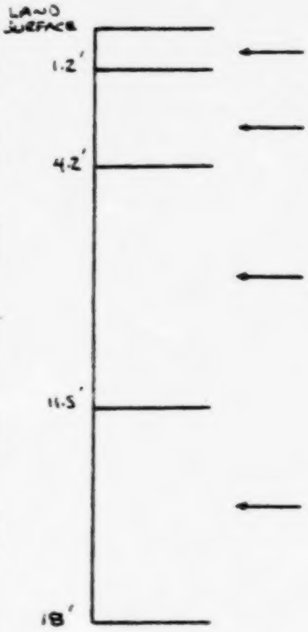
Well No. 113-A
Project Lovea Canal
Location 759 99th St. - front yard

Prepared By: Phil Spooner
Scale: 1"=5'

Date 10/16/80

WELL LOG

PROFILE **DESCRIPTION**



DARK BROWN LOAM, MOIST, FRIABLE, FILL

YELLOW BROWN, SANDY CLAY, SOMEWHAT FIRM, SLIGHTLY MOIST

PALE RED BROWN CLAY, MOIST, FIRM, PLASTIC, WEAK MOTTLES OF GRAY, YELLOW BROWN, AND RED

VERY PALE RED BROWN AND GRAY BROWN CLAY TO SILTY CLAY, VERY MOIST TO WET, VERY PLASTIC, VERY STICKY

SCALE: 1" = 5'

PROJECT Love Canal

OWNER State of New York

WELL NO. 114-A (113-A-2 to EPA/GCA)

LOCATION 759 99th St. - rear yard

	Date	Time
DRILLING STARTED	10/16/80	1342
DRILLING COMPLETED	10/16/80	1430

DRILLER Ron Bush

GEOLOGIST Phil Spooner

RIG TYPE CME-55

REFERENCE POINT land surface

R.P. ELEVATION 579.8

TOPO POSITION flat lying

PROFILE BY Phil Spooner

FIELD BOOK NO. 4 **PAGES** 51-53

WELL DATA

HOLE DIAMETER 8"

HOLE DEPTH 18.0'

CASING DIAMETER 2"

CASING LENGTH 20.2'

SCREEN DIAMETER 2"

SCREEN SETTING 14'-16' BLS

SCREEN SLOT/TYPE .001 stainless

PUMP TEST DATA

STATIC DEPTH TO WATER Dry hole

DATE MEASURED 10/16/80 @ 1513

PUMPING DEPTH TO WATER not tested

TEST DURATION

PUMPING RATE

TEST DATE

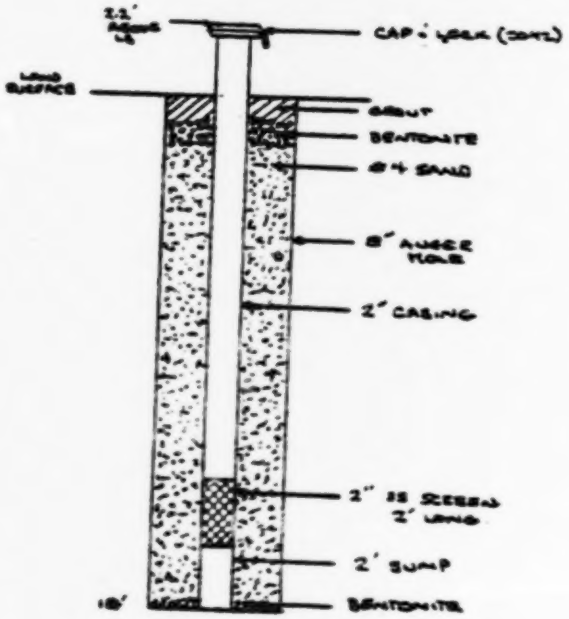
TEST TYPE

PUMP SETTING

SPECIFIC CAPACITY

REMARKS

AS-BUILT DRAWING



CHECKLIST

- Land Surface Elevation
- Casing Height Above L-S
- Total Depth
- Borehole Diameter
- Casing Diameter
- Casing Thickness
- Casing Lengths
- Screen Data
  - Material
  - Diameter
  - Slot Openings
  - Settings
- Centralizers
- Grout Type
- Gravel Pack
- K-Fittings
- Packers
- Cement Baskets

Rig Type CME-55

Driller Ron Bush

Supervisory Geologist Phil Spooner

Well No. 114-A (113-A-2)

Project Love Canal

Location 759 99th St.-rear yard

Prepared By: Phil Spooner

Scale: 1"=5'

Date 10/10/80